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JULY 1951

VOLUME 26 • NUMBER 7

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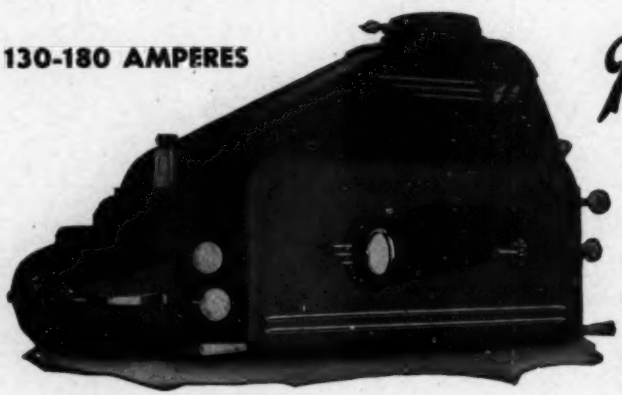

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HENRY B. SELLWOOD, *Editor*

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Published Monthly by

INTERNATIONAL PROJECTIONIST PUBLISHING CO., INC.

19 West 44 Street, New York 18, N. Y.

Telephone: MUrray Hill 2-2948

R. A. ENTRACHT, Publisher

SUBSCRIPTION REPRESENTATIVES

AUSTRALIA: McGills, 183 Elizabeth St., Melbourne

NEW ZEALAND: Te Aro Book Depot, Ltd., 64 Courtenay Place, Wellington

ENGLAND and DOMINIONS: Wm. Dawson & Sons, Ltd., Macklin St., London, W. C. 2

YEARLY SUBSCRIPTION: United States and possessions, $2.50 (two years, $4); Canada and foreign countries, $3; single copies, 30 cents. Changes of address should be submitted two weeks in advance of publication date to insure receipt of current issue. Entered as second class matter February 8, 1932, at the Post Office at New York, N. Y., under the act of March 3, 1879.

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MONTHLY CHAT

PREDICTIONS of six months ago anent the impending shortage of materiels vitally important to the motion picture theater are, alas, well on the way toward realization. There is no question now that it will take a lot of tall doing on the part of all concerned, particularly by projectionists, to see the job through.

High on the list of materiels in critical supply is motion picture film. The physical condition of film, and its conservation, is by no means wholly within the province of the projectionist, but he still is in a position to render a vital service to the over-all program. Probably the most important single factor in preserving film, sprockets, still are in plentiful supply. Why not do a complete sprocket job now?

Slated for revival from World War II days is the plan for salvaging copper drippings from carbons. Mention of this program will force a grim smile from projectionists, who will recall the inept manner in which this task was handled previously, largely because there was no provision for insuring the transit of drippings from projection room to their intended destination. This time, we are assured, things will be different.

Drippings will be picked up regularly from theaters by the film delivery drivers, with ultimate delivery to the reclamation point being assured. We urge all projectionists to give this plan another whirl. If the plan bogs down, IP will sound off, and loudly, in the proper quarter.

Another important angle: many theaters have lying about old equipment, or equipment which by reason of a change of policy will never be used. This is prime fodder for the reclamation program. Much better that it be sold for junk.

It should be distinctly understood that the reclamation program is just now getting up a full head of steam, largely in an anticipatory sense. New equipments of every description, however, are available right now in fulsome measure. If at all possible, buy *NOW*; six months from now may be too late.

PORTENDING a tough battle ahead is the move by Tv set manufacturers in outbidding film theaters for the Ezzard Charles-Joe Walcott fight—$100,000 as against the $65,000 bid by the movie houses. Of course, as the theater Tv circuit grows, even $100,000 will be in the picayune category. Significant here, however, is that the Tv people are not going to see their market for sets harmed by the failure of stay-homers to see those events. This out-and-out subsidy by Tv set makers gives film theaters much to ponder.

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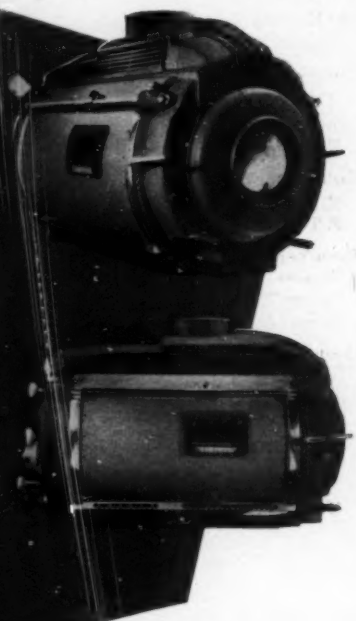

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INTERNATIONAL PROJECTIONIST

VOLUME XXVI JULY 1951 NUMBER 7

The Magic of Color

By ROBERT A. MITCHELL

III. Motion Picture Color Processes

EVEN though certain types of story are more effective dramatically when filmed in monochrome (black-and-white), the increasingly widespread use of color in motion pictures indicates that all but a few feature films will be photographed in full natural color in the near future.

There are several distinct processes by which movies may be made in color on 35-mm film. Of all these various methods, Technicolor is generally regarded as the most satisfactory in regard to color rendition and the preparation of release prints in color.

In order to appreciate the niceties of modern Technicolor, we must turn back the years and glance briefly at a few of the trials and tribulations of Technicolor during its development. The earliest Technicolor films, needless to say, bear scant resemblance to those of the present time. Perfect Technicolor did not come into being in a moment. Like most other modern marvels, many years were required to bring it to its present estate.

Inception of Technicolor

Dr. Herbert T. Kalmus, inventor of Technicolor, first tackled the problem of color movies back in the days of World War I. Then there were no natural-color films which could be run on standard theater projectors at the normal "silent" speed of 16 frames per second.

Color was sometimes *suggested* by ingenious tinting and toning of black-and-white prints; occasionally a novelty reel such as *Pathe Review* might contain a few feet of hand-colored film. (Hand-coloring required each individual frame of every print to be tinted by hand with water colors.) But no true *natural* color, except Kinemacolor, existed.

Kinemacolor, a British process, was the only noteworthy motion-picture color method in existence at the time Dr. Kalmus made his first experiments along this line (1909). It was the first serious attempt at color movies, even though Kinemacolor prints could not be run on a standard projector operating at normal speed and not fitted out with a rotating color filter. This process, of the greatest historical interest, must therefore be considered non-standard.

The Kinemacolor Process

The Kinemacolor camera made successive exposures through a rotating color filter having two sectors, one red and the other green. The print made from the negative was black-and-white, but *latent* color values resided in the density of the picture images. For example, a red apple in a frame exposed through the red camera filter appeared nearly white, but very dark gray in the succeeding frame exposed through the green camera filter. All that was needed to provide natural color in projection was a rotating filter attached to the projector.

Kinemacolor negative was photographed at 32 frames per second—twice the standard "silent" speed. Because most theater projectors were cranked by hand, it was extremely difficult to double the film speed in order to project Kinemacolor satisfactorily.

The upshot of this was a motor-driven Kinemacolor projector replete with the rotating filter having red and green sectors. In threading up this machine it was necessary to make sure that even-numbered frames synchronized with the red filter, and odd-numbered frames with the green filter. A mistake of one frame in threading (or in splicing a Kinemacolor print) resulted in a complete reversal of red and green colors in the picture.

Kinemacolor an Additive Process

Kinemacolor was thus an *additive* color method—the two fundamental colors used (red and green) were added together in various proportions to give a semblance of natural color. The eye of the movie patron accomplished the actual *mixing* of the two colors; and this was made possible by the great rapidity with which red and green frames followed one another—32 a second.

A white object in the projected Kinemacolor picture was actually red for 1/32 of a second, green for the same length of time, then red again, green, red, *etc.* An apple would appear red by being almost black when the green frames were projected and red during projection of the red frames.

It was absolutely essential that the frames of the print be projected by the same colors used in exposing the corresponding frames of the negative.

The very first Technicolor film was very much like Kinemacolor, except that the then standard film speed of 16 frames per second was used. But instead of a rotating color filter attached to the projector, every other frame of the print was dyed red all over its area, the alternate frames being tinted green. It may be said that the prints had their own color filters "built in."

The first production filmed in the origi-

nal Technicolor was *The Gulf Between*, released in 1917. This was the first natural-color film which could be run on any 35-mm projector at normal speed and without special attachments. The color reproduction, however, was far from satisfactory. The picture flickered very badly, and bright red and green fringes and halos surrounded all objects in motion.

It is easy to understand why moving objects were fringed with red and green. Adjoining red and green frames were exposed *successively* in the camera, one after the other—not *simultaneously*. A horse's tail, for example, might swish through a considerable distance in 1/16th second. The effect on the screen: two tails, one red and the other green. But when movement ceases, the red and green tails merge into one of natural color, restoring the animal to equine propriety.

Subtractive Process Utilized

Dr. Kalmus then abandoned his original color process for another in which two prints, one of them *toned* red and the other green, were cemented together back to back—a kind of forerunner of the present-day "duplitized" print. This second Technicolor process was important for two reasons. First, a split-beam camera was developed in order to avoid the color fringes which bordered moving objects. This new camera photographed two frames simultaneously, the intermittent unit pulling down two frames at each shift instead of one. A special optical prism accomplished the beam-splitting. A red filter was placed over one aperture, and a green filter over the other.

Second—and this is very significant,—*subtractive*, rather than additive, color-formation was utilized in projecting the prints. In short, pictures in full natural color were produced *on the positive film*. In the additive process, white is produced on the screen by a rapid succession of colors. But in the subtractive process, white is white on the finished print. This brings up the difference between *tinting* and *toning* positive prints.

It was seen that in the additive process alternate frames were tinted, or dyed, all over their entire area with the appropriate color—red or green. But in the double-print subtractive process the black silver image of each print is bleached out chemically and then *toned* to the desired color. The white areas of the print remain free from color.

Subtractive Process Details

One of the two prints was made from the frames exposed through the green camera filter, the "red" frames being omitted by step printing. The other print contains only the frames omitted from the first print—that is, the frames exposed through the red camera filter. Each of these two prints is accordingly exactly one-half the length of the complete camera negative from which they were made.

Now, the black-and-white print made from the "green" frames of the negative is toned to a red image, and the print made from the "red" frames to a green image. When combined by cementing them together, the composite print simulates, but does not reproduce exactly, the original colored scene.

Reds, greens, and brown shades came out with great accuracy; but the process was incapable of reproducing pure yellow, violet-blue, and the various purples. This deficiency was caused by the fact that only two colors—orange-red (crimson) and blue-green (aquamarine)—were employed. Because human color vision is *trichromatic*, three colors are needed to give perfect wide-range color reproduction.

Why was each print toned to a color *complementary* to that of the camera filter through which the frames on the negative were exposed?

Suppose a girl in a blue-green dress is photographed. Blue-green looks light-colored through a blue-green filter, but black through an orange-red filter. The positive printed from the green-exposed frames (toned red) reproduces the dress as white, or colorless. The positive printed from the red-exposed frames (toned green) reproduces the dress as green. And when the two toned frames are superposed, there is no red in the image of the dress to subtract green from the light shining through the film. The dress therefore appears green in the picture.

It is therefore a rule for all subtractive color-film printing that the color used for each "separation" be complementary to the color of the filter through which the particular negative was exposed.

This second Technicolor process was far more satisfactory than the additive one with alternate red and green frames. Nevertheless, it contained headaches aplenty. The double prints frequently buckled very badly in the projector—so badly, in fact, that the Technicolor Corporation had to keep "de-cupping" teams on the road to assist projectionists in the running of such productions as *Toll of the Sea*, made in 1922.

Technicolor's Imbibition Printing

But this process was also discarded. Dr. Kalmus, by discovering the secret of *imbibition printing*, had at last cleared the path for really satisfactory Technicolor. This dates back to 1923-1924. Im-

(*Continued on page 9*)

Electronic Color Measuring Instrument

COLOR from a direct light source can be measured quickly and accurately through the use of a new instrument developed by RCA Laboratories. Called a "tristimulus photometer," the new instrument uses only five electron tubes and is no larger than a shoe-box. It simultaneously determines the relative strength of the three basic color components in a light source under study and gives an instantaneous reading.

Previous methods of color specification require roughly one-half hour of measurement with a spectrometer followed by several hours of computation.

Though the spectrophotometric method gives a higher degree of accuracy, the tristimulus photometer can give values of the three-color components sufficiently precise for every-day engineering work and can readily distinguish between two different color samples which are close enough together in value so they would appear identical to the eye.

Measures Reflected Light Also

The instrument was designed specifically to provide a laboratory and studio check on the faithfulness of color reproduction in color television. However, since it can determine the values of a reflected light source as well as a direct one, the device may also have valuable application in other industries where color matching is critical.

A direct-reading electronic instrument has been designed by the National Bureau of Standards of the U. S. Department of Commerce, which can define the components of reflected light, but cannot handle a direct light source such as that of a television screen.

Apparatus Has "Eye" and "Brain"

The new instrument consists essentially of an "eye" and a "brain." The "eye" is made up of a lens which focuses the light under study onto a mirror assembly designed to split the beam into three parts of equal intensity. The three beams then pass through three filters, each sensitive to a range of wavelengths corresponding to the basic color components.

The "brain" of the instrument starts with three photocells, one for each filter. The photocells convert the light energy to electrical energy which passes through circuits, each of a different design, to compensate for the mathematical dissimilarities between the three color components. Finally, a corrected value for each component is read on microammeters.

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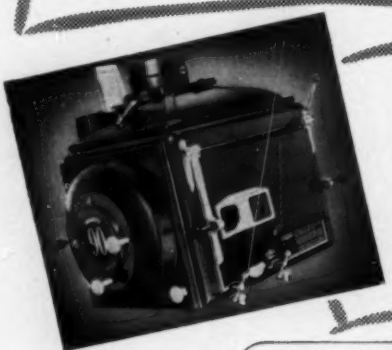

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bibition printing still is the heart and soul of the Technicolor process.

A fundamental requirement to be met in subtractive color printing is *exact registration* of the superimposed colored picture-images. If the superimposed images are not accurately registered, the colored picture will look blurry on the screen, no matter how carefully the projectionist focuses the lens.

With the old-style Technicolor, only two colors, crimson and aquamarine, had to be combined. This was hard enough to do; but modern Technicolor makes use of three printing colors. The perfection of modern full-range Technicolor is a truly marvelous engineering achievement.

But let us return to old-style Technicolor to see how the first imbibition-printed color films (*The Black Pirate* in 1925, followed by *The Viking* and a number of "fashion reels") were made.

Early Imbibition Printing

From the negative made in the split-beam movie camera, two positive prints are made, one from the "red" frames and the other from the "green" frames, as previously described. Instead of being toned, however, the two prints are left uncolored. These are not intended for projection, but are converted by Technicolor magic into "wash-off relief" printing films called *matrices*.

The two positives are chemically treated to convert the black silver images they contain into creamy-white silver chloride. A subsequent "tanning" operation results in a hardening of the gelatine in the image. Washing then removes all of the gelatine from the clear areas of the film. This leaves the image in faint outline, raised in relief like a rubber stamp. The dark and light portions of the picture are therefore represented by varying thicknesses of hardened gelatine.

All that now remains to be done is to print colored positives from the two matrices for projection. This feat requires a special printing machine which bears not the slightest resemblance to a regular black-and-white film printer. The imbibition process is not photographic at all—it is more like lithography than anything else. Clear gelatine-coated film is used as the printing stock. It need not contain any silver unless a soundtrack is to accompany the picture.

The matrix made from the green-exposed frames is passed over rollers which transfer red (crimson) dye to its relief images. The gelatine of these images soaks up the dye, the amount of ink any particular part of the image imbibes depending on the thickness of the gelatine. Areas having thick gelatine soak up a large amount of dye; thin layers of gelatine imbibe relatively little; the clear film-base none at all. The other matrix—the one made from the red-exposed frames—is treated with green (aquamarine) dye.

As the process was carried out, the clear gelatine-coated film used as raw stock was impressed first with the crimson and then with the corresponding aquamarine images in superposition. Pressure rollers effected the impression. To insure perfect registration, the raw printing stock and the matrices are held very taut in the printing machine. The sprocket teeth are the exact shape and size of the film perforations.

Technicolor Positive Prints

The Technicolor positive is ready for projection as it comes from the printer. A large number of positives may be printed from a single set of matrices; but when these wear out, a new set is made from the camera negatives.

The emulsion side of an imbibition print has a glossy appearance, almost

(*Continued on page* 33)

Number of Tv Receivers in Use: Nation-Wide Figures

The following figures are based on the population residing within the 0.1-millivolt contour, which is considered to fall approximately 60 miles from station. Computations based on national totals projected to June 1, 1951. This table prepared, published and copyright, 1951, by TELE-TECH, the leading journal in the electronics field.

City	Families	Sets Installed	% Saturation	Number of Stations
Ames	195,200	49,000	25%	1
Atlanta	311,000	99,000	32%	2
Baltimore	461,000	292,000	63%	3
Birmingham	252,400	47,500	19%	2
Bloomington	49,300	15,400	32%	1
Boston	1,084,000	720,000	66%	2
Buffalo	309,400	195,000	63%	1
Charlotte	330,800	63,000	19%	1
Chicago	1,668,400	910,000	55%	4
Cincinnati	432,600	249,000	58%	3
Cleveland	804,800	465,000	58%	3
Columbus	327,300	141,000	43%	3
Davenport	205,100	51,000	25%	2
Dayton	275,500	123,000	45%	2
Detroit	907,200	450,000	50%	3
Erie	84,800	45,500	54%	1
Grand Rapids	194,500	79,000	41%	1
Greenboro	162,100	59,000	36%	1
Huntington	187,500	39,000	21%	1
Indianapolis	390,200	120,000	31%	1
Jacksonville	113,800	28,700	26%	1
Johnstown	310,100	77,000	25%	1
Kalamazoo	153,700	36,000	23%	1
Kansas City	471,900	111,000	24%	1
Lancaster	215,900	86,500	40%	1
Lansing	206,900	47,200	23%	1
Louisville	256,400	85,000	33%	2
Memphis	269,900	81,000	30%	1
Milwaukee	373,600	232,000	62%	1
Minneapolis	452,900	257,000	57%	2
Nashville	205,700	25,500	12%	1
New Haven	515,400	149,000	29%	1
New York	3,887,000	2,300,000	59%	7
Norfolk	204,200	61,500	30%	1
Omaha	217,600	68,000	31%	2
Philadelphia	1,343,900	835,000	62%	3
Pittsburgh	729,200	247,000	34%	1
Providence	406,100	141,000	34%	1
Richmond	133,700	70,500	53%	1
Rochester	216,700	795,000	37%	1
Schenectady	322,500	151,000	47%	1
St. Louis	567,700	275,000	48%	1
Syracuse	205,200	111,000	54%	2
Toledo	300,100	89,000	30%	1
Utica	124,100	39,500	32%	1
Washington	450,600	249,000	55%	4
Wilmington	135,400	61,000	45%	1

NON-INTERCONNECTED CITIES

City	Families	Sets Installed	% Saturation	Number of Stations
Albuquerque	133,100	8,100	6%	1
Binghamton	84,100	35,300	42%	1
Dallas, Ft. Worth	369,800	111,000	31%	3
Houston	307,500	71,000	23%	1
Los Angeles	1,537,800	890,000	58%	7
Miami	154,600	56,500	37%	1
New Orleans	257,700	53,500	21%	1
Oklahoma City	239,000	81,500	34%	1
Phoenix	89,600	38,500	43%	1
Salt Lake City	83,700	39,500	47%	2
San Antonio	157,000	42,500	27%	2
San Diego	182,100	89,000	49%	1
San Francisco	974,300	171,000	18%	3
Seattle	425,400	77,000	18%	1
Tulsa	152,500	67,000	44%	1
Total Stations	107	Total TV Sets		12,752,700
Total Families	26,571,500	Average Saturation		48%

Carbon Arc Screen Light†

By M. T. JONES and F. T. BOWDITCH
National Carbon Co. Research Laboratories

In a carbon arc motion picture projector, definite relations exist between screen light on the one hand, and the arc current, current density, carbon size and the speed and collection angle of the projector optical system on the other. Measurements on more than 100 standard and experimental carbon arcs, with carbons ranging in size from 9- to 16-mm, have provided data to establish these relationships.

IN AN earlier paper[1] a method is described for calculating motion picture screen light from measurements of brightness over the carbon arc crater as viewed from selected angles, and from a consideration of the characteristics of the particular optical system involved. This method has now been applied to a variety of standard and experimental carbons, and the resulting data analyzed to establish certain significant relationships.

These relationships are concerned with the distribution and the amount of light delivered to the motion picture screen, as these are determined by the arc current, the current density, the size of carbon and the collection angle and speed of the optical system.

As an illustration of the basic data from which these trends are established, calculations made from measurements on three experimental trims, each at its maximum operating current, are shown in Figs. 1, 2 and 3. In this, and in all subsequent cases throughout this paper, these calculations are made according to the method previously described,[1] for the one best-focus condition giving maximum screen light.

Light Loss Correction of Data

Each of these curves shows, on the left, the lumens through the motion picture aperture and, on the right, the light distribution across the aperture, each over a range of light-collecting angles from the source, and for a series of optical speeds into the aperture.

Light losses due to absorption, shadowing and vignetting, which always occur in varying degree in any specific optical system, have not been included in these present calculations, a permissible simplification since only relative values are considered in the conclusions drawn here. A suitable loss correction of approximately 50% would have to be applied to the lumen values given in this paper in order to determine the actual screen-light level in any particular instance.

As an example, crater light measurements on an 8-mm to 7-mm "Suprex" trim at 70 amp, calculated for an F:2.0 mirror, predict a flux of 27,600 lm on the aperture, compared with 14,000 lm motion picture screen light realized in practice. This is because mirror absorption and reflectance losses, plus shadowing due to the positive head, etc., amount to about 20%; while of the total lumens passing the film aperture, no more than about 65% reaches the screen due to a combination of spill-over, vignetting and glass transmittance losses at the projection lens.

With respect to the aperture-lumen variations shown by Figs. 1, 2 and 3, these confirm the earlier conclusion[1] that maximum luminous flux is not necessarily obtained at the maximum collection angle; the simple concept that a bigger collection angle picks up more light from the source and hence delivers more light to the picture screen fails to work out.

With a fixed speed into the aperture, the optical geometry is such that the magnification of the crater image on the aperture increases as the pickup angle increases, thus introducing a loss factor, working against the greater light collection.

The light distribution characteristics of high-intensity carbon arcs are such that a collection angle is reached at each speed beyond which more light is thrown outside the aperture by the enlarged image than can be collected by the higher pickup angle. The exact pickup angle at which this maximum light value occurs will depend in each instance on the particular light distribution characteristics of the carbon in question.

Various Trims Light Characteristics

A small carbon, for instance, with a peaked light distribution, effectively utilizes a higher magnification ratio and hence a higher pickup angle than is required with a larger carbon with a more uniform light distribution.

Figure 1 gives the light characteristics of an experimental 9-mm carbon oper-

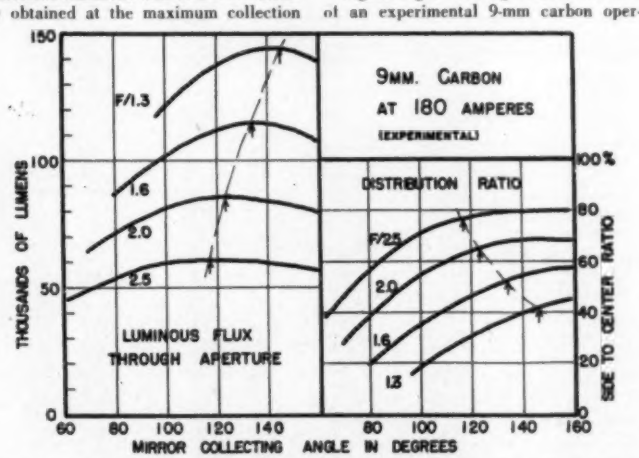

FIG. 1. Screen-light characteristics of an experimental 9-mm high-intensity positive carbon at its maximum operating current in water-cooled jaws.
NOTE: All light and distribution values throughout this paper are based upon the best-focus condition giving maximum screen light.

† J. Soc. Mot. Pict. & Tv Eng., March, 1951.
[1] "Motion Picture Screen Light as a Function of Carbon Arc Crater Brightness Distribution," by M. T. Jones; J. Soc. Mot. Pict. Eng., Sept., 1947.

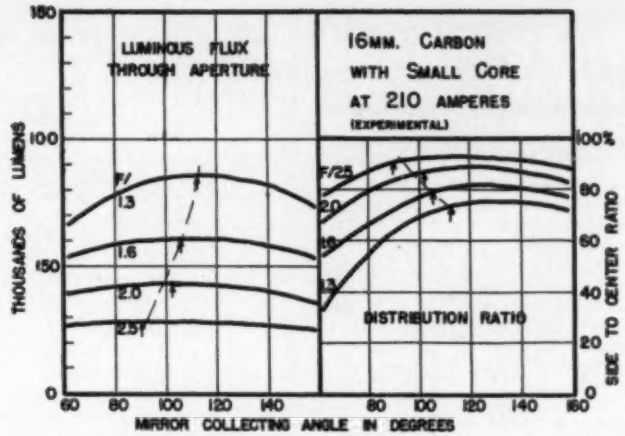

FIG. 2. Screen-light characteristics of an experimental 16-mm high-intensity positive carbon, with small core, at its maximum operating current in water-cooled jaws.

ated at 180 amp, a very high current for this size. It is seen that high collection angles are effectively utilized at the various optical speeds to give good screen light values, but at comparatively low distribution ratios.

Figure 2 shows the similar characteristics for an experimental 16-mm carbon with a small core, operated at 210 amp. Here a much smaller collection angle gives maximum screen light, and the distribution ratios are considerably higher.

Figure 3 shows the light-output characteristics of another experimental 16-mm carbon with a large core, operated at 460 amp, the maximum current used with any of the approximately 100 positive carbons upon which the conclusions of this paper are based. Particularly with this carbon, the light output and distribution ratio are comparatively insensitive to the choice of collecting angle, since, with the large core and high current, the effective source is quite large and of more uniform brightness.

Light Distribution Ratio

It might be noted that in no case is a 100% distribution ratio reached. Particularly with the large-cored 16-mm carbon at F:2.0, the effective source size is quite sufficient to fill the aperture completely from all angles of view. However, the crater of any high-intensity carbon is always brightest near the center, and this peak is carried through as higher illumination in the center of the screen.

Data such as those shown in the preceding figures have been correlated for approximately 100 different positive carbons, both production and experimental types, of 9-, 11-, 13.6- and 16-mm diameter. It is, of course, recognized that the smaller 7- and 8-mm Suprex carbons are very important items, commercially, although they were not within the scope of the investigation reported here.

Certain basic behaviors have been disclosed by these correlations. The first such relationship is that between screen lumens and arc current for various carbon sizes and optical speeds.

Basic Behaviors Revealed

Figure 4 shows this relationship at a speed of F:2.0 and for carbons of 9-, 11-, 13.6- and 16-mm diameter. Each curve results from measurements on a number of different-type carbons of a given size, each carbon represented by a single value determined at the maximum stable current for that carbon.

For example, referring to the extreme points on the curve for the 16-mm size, one type of 16-mm positive carbon was found to give 32,000 lm at its maximum current of 150 amp; while another 16-mm positive carbon of very different construction gives 68,000 lm at its maximum current of 460 amp.

The curves of Fig. 4 show the smallest carbon most efficient in current utilization, although, as will be indicated later, factors other than maximum current efficiency are involved in the choice of a preferred trim for a particular situation.

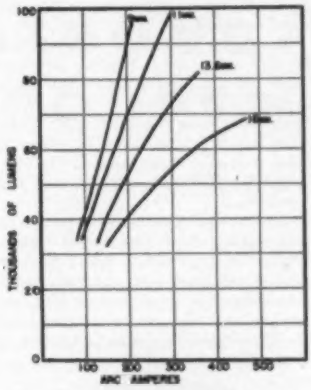

FIG. 4. Relation between screen light and arc current at an optical speed of F:2.0.

It will be noted that the curves for the 13.6- and 16-mm carbon sizes are concave downward, indicating a falling-off in current efficiency with increasing amperage on a given size, which is probably the result of the inability to cool the larger diameters as effectively as the smaller. For instance, the 16-mm carbon at 150 amp gives more than 200 lm/amp;

(*Continued on page* 30)

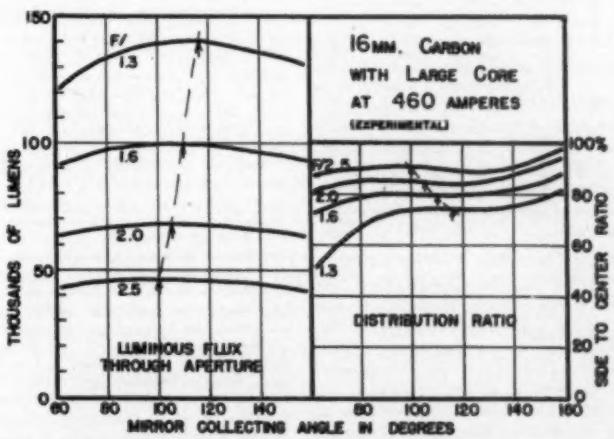

FIG. 3. Screen-light characteristics of an experimental 16-mm high-intensity positive carbon, with large core, at its maximum operating current in water-cooled jaws.

Seven-Year Survey of Film Print Damage

By ERNEST TIEMANN and DENCIL RICH

University of Indiana Film Center

IN VIEW of the emerging critical shortage of raw film stock, the division of adult education and public services at Indiana University has made a number of studies covering a seven-year period to determine the cost of film maintenance and film damage and ways to reduce such film damage.

In making the study, a detailed classification of injuries to film was developed from film damage reports filled out by inspectors of periodical analysis and evaluation. From this information a complete report was prepared to determine what course of action needs to be taken to assist users in keeping film damage to a minimum.

Accessioned print control, inspection, and booking cards were studied for each of the 192 prints. It was found that careful inspection and use records were maintained for each of these films. By checking the booking records, we found that the 192 prints were used a total of 18,149 days—an average of 94.5 days for each film.

Average Replacement Footage

We discovered that for the seven-year period 83 of the 192 prints were damaged to the extent that replacement footage was needed. A total of 110 different replacement parts were added, requiring 5,264 feet of film. All of these replacements were black-and-white except one. The total cost amounted to $476.36. Our figures showed that the average cost for replacement footage per print has been approximately $2.50. Our maintenance costs for replacement parts alone totaled $2.50 for each print in general during the seven years.

Our further study showed that a number of factors influence the maintenance cost of damaged film replacement. These include: 1) the number of bookings; 2) standards of maintenance; 3) proportion of black-and-white and color prints; 4) fluctuating costs of replacement parts; 5) technical improvement in projection equipment; 6) training of projectionists.

Faulty Threading a Major Cause

We find that the damage of sprocket teeth marks on sound tracks is no longer as serious as it was in former years. This may be due to one of two things, or both: the use of silent projectors has dropped off considerably, or the literature sent out by many film distributors is working for our benefit also. Many of these concerns are using leaflets with their shipments which warn of the consequences of threading sound film into silent projectors.

Were it not for our constant practice of keeping each film provided with a leader and credit title of appropriate length, the damages reported would no doubt be much more numerous. On many occasions various films are saved from injury by the fact that the leader and the credit title serves as the necessary margin of warning to the operator to stop the machine when the film does not feed correctly.

Failure of proper loop formation, for instance, accounted for many of the numerous injuries at the beginning of films. We are overcoming this hazard to a considerable extent by sending all users of our films, without cost, a 100-foot roll of practice film. We recommend this procedure to all film libraries as a sound measure of reducing film damage.

Checking Procedure Followed

Our survey has borne out our previous conclusion that 800-foot films require proportionately less maintenance expense than films of shorter length. In our library, 800-ft. prints comprised approximately 26% of the total, yet only 17 per cent of the partial damages and 17 per cent of the total damages were among these films. Damages rarely occur at the ends of 800-ft. films.

As a basis for our study, we followed the following procedures:

We separated total from partial damages, then broke down the reports into months and into the four lengths of films involved—400, 800, 1200, and 1600 feet. For each month for each length of film we tabulated and classified all the damages, indicating the data relative to the color of the film amount and location of the injury, and the type of injury.

After all damages were classified each damage type was given a code number for ease in handling data. There were 28 such classifications which we set up in a series of charts from which the conclusions herein were taken.

Some Damage Classifications

In the survey, the total black-and-white film damage at the beginning of 400-foot films amounted to 2863 feet, with 814 feet of color film damaged. Chipped sprocket holes accounted for 40% of the 96 damages reported.

Damages that started and ended in the middle of 400-foot films amounted to 1874 feet for black-and-white, and 271 feet for color film. On the extreme end of 400-foot films, a total of 58 damages was found. Damage to black-and-white film amount to 1225 feet, and 589 feet of color film were damaged.

A total of 57 damages on 800-foot black-and-white films were found, and a total of 10 damages on color film was found. Total footage damaged on black-and-white film amounted to 1386 feet, and 686 feet on color film. Few damages to 1200-foot films were found, with only 31 reported and 1081 feet damaged. On 1600-foot films, 22 damages were reported, with 2442 feet of film involved.

Theater Equipment in Critical Supply Listed by NPA

NPA has asked IP to enlist the support of all projectionists in the conservation of critical materials needed for national defense.

Full cooperation of the motion picture industry in promoting conservation and salvage of critical materials to aid the nation's defense effort was promised by motion picture industry representatives at a recent conference with NPA officials.

Need for conservation of such materials as copper, cobalt and nickel, used in manufacture of motion picture equipment is acute. A single jet engine requires one ton of nickel. A shortage of in-car speakers for drive-in theaters looms within the next few months, officials say. Demand for loudspeakers for this use can be met by repairing defective speakers which ordinarily are discarded and by guarding against loss of speakers. Speaker magnets contain nickel and cobalt. As these magnets may be used again in rebuilt speaker units, NPA pointed out that manufacturers and distributors who establish a rotating inventory of rebuilt speaker units will help greatly to keep the drive-in theaters in operation.

Other conservation measures discussed centered on copper drippings, dry plate rectifiers, obsolete equipment and film handling. Trade sources estimate that 100,000 pounds of pure copper could be recovered, annually, from motion picture theater drippings. The copper content of the drippings averages about 94%.

Manufacture of copper-oxide dry plate rectifiers up to 65-ampere capacity may have to be prohibited to save copper. This dry plate rectifier uses about 35 pounds of copper, in contrast to the one-half pound of copper used in tube rectifiers. If making of copper-oxide dry plate rectifiers up to 65 ampere capacity is prohibited, NPA does not contemplate eliminating manufacture of repair parts for rectifiers now installed.

Thirty-five mm film is the most critical of all the materials used in the motion picture industry. NPA stressed the need for great vigilance in handling film to get the greatest possible use from the available supply.

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Effective Cleaning Aids

BOTH as routine, to keep his apparatus in top trouble-free condition, and on special occasions, as when a generator bearing threatens to "freeze," the projectionist is faced with cleaning jobs. Mechanical aids, such as brushes, rags, lens tissue and vacuum cleaner are obvious helps. Liquid or "chemical" cleaning aids are not always so well understood because they are of several types, and the right type must be used for a given job. They act primarily by dissolving the dirt, and the kind of liquid to be used depends upon the kind of dirt to be dissolved. The type of apparatus on which the cleanser is to be used must also be considered.

Classifying these "chemical" aids in the broadest possible sense, they are of three general types. One, of course, is water—hot or cold. A second consists of non-aqueous solvents—liquids that dissolve substances which water won't attack—for example, carbon tetrachloride. The third and most numerous type might be called coupling agents—something that couples water with substances that normally do not dissolve in water, enabling the water to dissolve them. A more correct but narrower term for "coupling agent" is "emulsifying agent." Common soap is an emulsifying agent but by no means the best one for all purposes.

Non-Aqueous Solvents

What cannot be cleaned with water—as applied, for example, with a damp rag—may perhaps be cleaned by substances of the second type named, carbon tetrachloride, for example, applied by means of a rag. In the case of a motor or generator bearing, where the lubrication has gummed and must be removed and replaced, carbon tetrachloride also is used. So is kerosene, warm or cold; and hot oil—the same lubricating oil—is very useful.

Wherever oil or grease must be removed, water alone can be ruled out as ineffective. Oil and water don't mix. An emulsifying agent is needed to make them mix—soapy water will remove grease that plain water won't touch. But there are also direct solvents, as stated, depending on the type of oil. In addition to those already mentioned, alcohol and acetone may prove effective.

Various Coupling Agents

Alcohol and acetone, although solvents in their own right, can act more or less as coupling agents, that is, some substance not soluble in water can often be washed away by mixtures of alcohol and water, or of acetone and water. Trisodium phosphate, or tetra-sodium phosphate, which can be obtained either at the drug store or from the firm that supplies the theatre's porters with cleaning materials, are highly effective on some problems. Many commercial soap powders and cleansers, obtainable at any grocery, are mixtures of these phosphates and common soap.

Hydrogen peroxide — which actually consists of about 2% peroxide and 98% water—acts as a coupling agent in cleaning out projector heads after film fires. The action in this case possibly is one of oxidation rather than an emulsifying action. Common lye has a very powerful action on some types of grease in still another way—it converts the grease to soap.

The practical problem confronting the projectionist in his choice of cleaning agents boils down to three simple, practical points: the agent must be effective, it must not cause corrosion.

Effectiveness can always be determined by trial and error; the other two points will require either some understanding of the actions involved or else a small bit of memorizing.

Harmful Cleanser Residues

As to harmful residues: any substance which does not evaporate completely is going to leave a residue which may or may not be harmful. Soap, unless most thoroughly flushed away, will leave a soapy film. Tri-sodium phosphate and similar detergents, unless thoroughly flushed away, will leave crystalline deposits. Hot oil used for cleaning bearings and grease cups is almost certainly going to leave an oily film behind—that is why only the same lubricating oil should be used. Kerosene is for that reason less satisfactory: some will remain to dilute the new lubricant at first. However, it is slowly volatile and in time will evaporate. Carbon tetrachloride will evaporate quickly.

Acetone, alcohol and carbon tet all evaporate much faster than water. They leave no residue. Water leaves none, neither does hydrogen peroxide. However, water and hydrogen peroxide are a little slow to evaporate, and they may cause some corrosion before they disappear completely.

Hydrogen peroxide has a corrosive effect on metals; this applies to water also, but to a somewhat lesser extent. Soapy water not thoroughly flushed off is particularly corrosive because any film that remains behind will be a film of water as well as soap, and the water won't dry off for a very long time. The soap will hold it in contact with the metal, keeping the metal moist, possibly for weeks.

Stirring kerosene into water, up to about one part kerosene to two parts water, reduces the possibility of the water causing corrosion of metal with which it comes into contact.

Kerosene and hot oil, alcohol, acetone and carbon tetrachloride produce no appreciable corrosion. Lye is extremely corrosive.

Solvent Effect on Film

Acetone and even alcohol have a solvent effect on motion picture film, and should not be used, or used only with great care, in cleaning film or grease. *Hot* water exercises a solvent action on the emulsion of film, tending to soften or dissolve it. Even cold water may cause the emulsion to swell after a period of time, but can be used for cleaning film with perfect safety unless the film is going to be left wet for hours.

The "organic" solvents—carbon tet, alcohol, acetone—should not be used in cleaning compound lenses. Should they seep into the cement that holds the lenses together, they may dissolve it.

Many of the aids here named are used in commercial cleaning compounds. In order to avoid their misuse, always apply such compounds strictly according to directions and only for the purposes and conditions specified.

Many of these aids also can be obtained in commercial form under other names. Impure carbon-tet is used in fire extinguishers; mixed with kerosene or naptha it is found in popular dry cleaning and stain removing compounds. Acetone is a component of many film cements and is found also in nail polish remover and in varnish and lacquer removers.

Revised Audio-Visual Booklet

National Audio-Visual Assoc., 845 Chicago Ave., Evanston, Ill., is out with a new revised edition of "Current Models of Projection Equipment." Copies are $1 each, postpaid.

The 12-page pamphlet contains up-to-date specifications and prices for the projection equipment manufactured by 40 companies. It includes a total of 186 models of projection equipment classified as follows: 39 16-mm. sound projectors, 15 automatic projectors, one microscopic projector, 15 opaque and combination projectors, 11 overhead projectors, 80 slide and filmstrip projectors and 25 sound slidefilm projectors.

U. S. Dominance in World Film Mart

Approximately 74% of all feature films shown in the world's theaters are made in the U. S., reports the Dept. of Commerce. About 38% of total motion picture profits are derived from foreign showings, with about $100 million remitted to the U. S. annually.

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There is no substitute for the carbon arc.

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Proposed Lantern-Slide, Slidefilm Standard

Numerous suggestions have been received by the American Standards Association following the circulation in the field for the usual period of one year of the proposed American Standard for Lantern Slide and Slidefilm Projection. This proposed standard (Z38.7.20), first promulgated on June 1, 1950, will now be reconsidered by the proper committee, with final recommendations expected shortly.

Anybody having any suggestions to offer anent this proposed standard is urged to communicate *immediately* with the ASA at 70 East 45th St., N. Y. City, 17. The proposed standard follows:

1. Screen Illumination

1.1 The illumination on the screen should be adequate to give at least 5 foot-lamberts.

1.2 The projector illumination should be maintained to give the illumination indicated in Fig. 1 for beaded or matte screens of the size required to meet the other items of this standard.

1.3 Screen lumens shall be measured according to Section 3.4 of American Standards Methods of Testing Printing and Projection Equipment, Z38.7.5, 1948.

2. Screen Maintenance

2.1 When the illuminated screen appears darker than a clean piece of white typewriter paper held in contact with the screen, the screen should be cleaned, resurfaced, or replaced.

3. Use of Beaded-Type Screens

3.1 The front row of seats shall be at least 2½ times the width of the screen away from the screen.

3.2 The back row of seats should be not more than 5 times the width of the screen away from the screen.

3.3 The outer row of seats on each side should be not farther than 20 degrees from a line connecting the projector and the center of the screen.

4. Use of Matte-Type Screens

4.1 The front row of seats should be at least two times the width of the screen from the screen.

4.2 The back row of seats should be not more than five times the width of the screen away from the screen.

4.3 The outer row of seats on each side should be not farther than 30 degrees from a line connecting the projector with the center of the screen.

5. Room Illumination

5.1 During the projection periods the illumination of the room should not exceed 0.1 foot-candle. The room lights should be arranged so that no direct light from them reaches the screen. Dimmer circuits for providing a graded transition of lighting are recommended for auditoriums and classrooms.

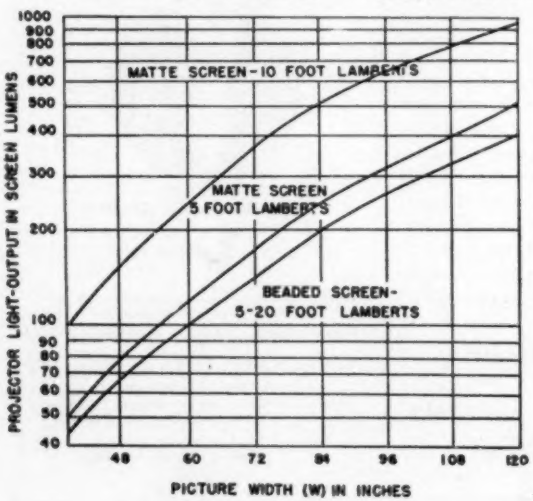
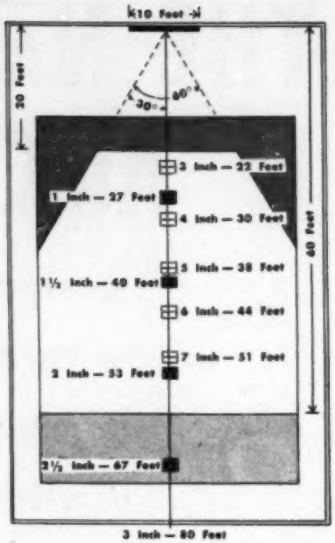


FIGURE 1

Showing the maximum recommended picture widths for projector light output.

Tips on Non-Theatrical Movie, Slidefilm Showings

Many very helpful hints anent the various factors affecting the success of non-theatrical movie and slide projection are contained in a recent bulletin issued by Da-Lite Screen Co., Chicago 39, Ill. Of prime importance is the use of the right size and type of screen for a given showing, and to this end Da-Lite provides the accompanying handy chart.



Da-Lite screen viewing chart, Open, ruled squares relate to the positioning of a 35-mm slide projector, with various lenses; solid block squares relate to a 16-mm motion picture projector, with various lenses. Unshaded portion denotes, of course, preferred viewing area.

A simple formula used by many audio-visual specialists recommends a minimum viewing distance of twice the screen width, and a maximum viewing distance of six times the screen width. To apply this 2 x 6 formula as illustrated by the chart, divide the maximum viewing distance (back row of seats) by 6. The result is recommended screen width. If a square screen is to be used, height will be the same as width. In rectangular screens the height is automatically established on the basis of a 3 x 4 proportion. In cases where the available projection lens does not fit the recommended screen size, it may be necessary to use a longer or shorter focal length lens.

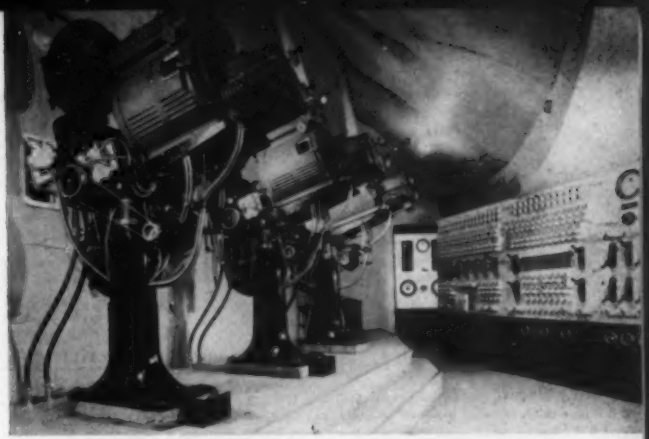
To find the exact screen size: aperture width x projection throw ÷ lens focal length = width of screen needed. For example: Aperture 0.38 (16-mm movie projector) x 26 feet (projection throw—desired distance from screen) ÷ 2 (lens focal length) = 4.94 feet, or approximately 58 ÷ inches. Thus one would use a 45 x 60-inch screen.

Copies of this bulletin and other Da-Lite projection aids are available for the asking.

Scientific Film Show at The Hague

The Fifth Annual Congress of the International Scientific Film Association will be held in the Municipal Museum of The Hague, Holland, from Sept. 15 to 22 next.

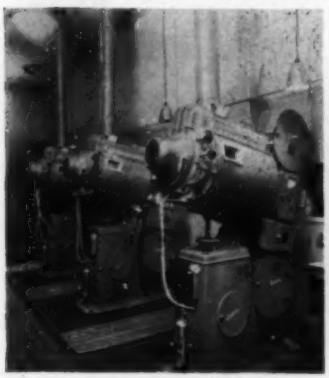
Projection Rooms Around the World



SPACIOUSNESS, UTILITY MARK THIS SWEDISH ROOM

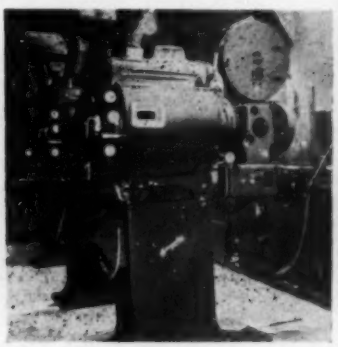
A most interesting installation in the China Theater, Stockholm, showing belt-driven Ernemann projectors mounted on an elevation, and, at rear right, control panels for all power and light in the theater. Cleanliness is a "must" in all Swedish projection rooms.

PROJECTION IN THE ANTIPODES



Comparing favorably with America's best is this projection room in the Regent Theatre, Melbourne, Australia. Complete installation by Westrex, including Australian-made arc lamps of indubitable American design much like the Peerless.

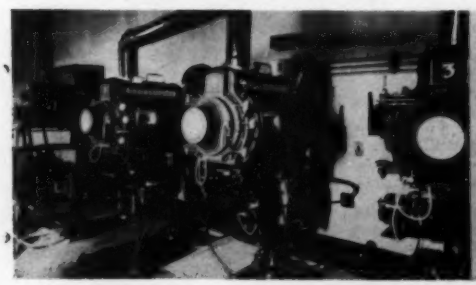
NO TENT SHOWS: PROJECTION ROOMS IN THE STRAITS SETTLEMENTS



Capitol Theater, Singapore (left): Simplex E-7 projectors and sound equipment, Peerless lamps, Brenkert effect projector, Rect-O-Lite rectifiers. The largest in Singapore, this theater was opened in 1929. Note "surface wiring." The Rex Cinema, Singapore (right): Super Simplex projectors, RCA sound, Peerless lamps, and tungar rectifiers.

CINE METRO, LIMA, PERU

This closeup of front room wall evidences typical Loew planning and attention to detail.



METRO PASSEIO, RIO DE JANEIRO

This sleeper-jump from projectors to amplifier rack suggests possible future conversion of room to a skating rink.

IN THE SPOTLIGHT

By *HARRY SHERMAN*

LAST month we presented a few suggestions about the individual's Social Security status, in the course of which we mentioned that, in the event of retirement, there were *three* kinds of benefits available, and that in the event of death there were *five* elective courses for a man's family. We advised consulation with the nearest S. S. field office by anybody interested, assuming that this was the easiest procedure.

Not so. We've had many requests for details of these various forms of benefits. So here goes, although we still favor a personal visit to the nearest S. S. office.

S.S. Retirement Benefits

During your retirement, three kinds of benefits are available. These are:

1. The primary amount, which is the monthly sum paid to a retired man himself, beginning at age 65 and continuing for life. This ranges from $20 to $80 a month.

2. The wife's benefit, which is half of the primary amount, paid to the man's wife during her lifetime if she qualifies. A man and wife together may receive $120 a month or $1440 a year.

3. The child's benefit, also half the primary amount, paid to a qualified child, usually until the age of 18. The maximum benefit to a family is $150, or $1800 a year.

S.S. Death Benefits

A family is entitled to one or more of five possible S.S. benefits, if the head of the family dies. They are:

1. Widow's benefit: a monthly payment of three-quarters of her husband's benefit.

2. Mother's benefit: a monthly payment of three-quarters of the primary amount paid to a widowed mother having a qualified child in her care. (She may receive either the widow's benefit or the mother's benefit, but not both).

3. Child's benefit: three-quarters of the primary amount for one qualified child. If there are two or more qualified children, each receives one-half of the primary amount and another one-quarter is divided among them.

4. Parent's benefit. In some cases, a parent is entitled to three-quarters of the primary amount.

5. Lump-sum benefit. Under the new law, whenever a fully or currently insured person dies, a lump sum amounting to three times the primary amount is paid to cover funeral expenses.

If a retired worker earns more than $50 a month as an employe or in self-employment, he and all those receiving benefits through him are cut from the S.S. rolls. An exception is the 75-year-old worker, who may earn as much as he pleases without the loss of any benefits.

Incidentally, veterans of World War II are credited with having earned $160 a month during the period of their service.

• The membership of Local 253, Rochester, N. Y. turned out en masse at a breakfast party given in honor of their president, Louis Levin, and Fred Boekhout, their business representative. Beautifully inscribed cigarette lighters bearing the IA emblem were presented to Lou and Fred in appreciation for their long service to the Local.

• New York City Local 306 has insured its members for complete medical care through the Helath Insurance Plan (HIP) of Greater New York. Under this plan, about 2300 members and their wives will receive comprehensive medical, surgical and specialist care at their homes, at the offices of doctors chosen by the members themselves, in HIP medical centers, and in hospitals. In addition, they will be entitled to laboratory tests, X-ray examinations, visiting nurse service, and ambulance transportation.

The HIP premium is paid out of a 5% contribution to the Union welfare plan by employers, who make this contribution in lieu of a wage increase direct to the members. The first group of members began to receive this service last February; the other members will benefit from this plan as soon as additional employers contribute to the fund.

The foregoing brings to mind an item we read in a recent issue of the *United Mine Workers Journal*, and which is in direct contrast to the services rendered by HIP. Asked about the doctor situation in his area, a Kentucky miner told this story: "My wife was about due to have a baby. I went to the doctor's office four times and asked him to come down and see her. Each time he gave me some excuse. The fifth time I took my snub-nose (a small pistol, in Kentucky parlance) along and brought him back with me." The ironic part of this story is that the doctor had a contract with the union to which the miner belonged and was handsomely paid through the checkoff system for his services to the miners.

• We were sorry to hear that Bill Maxon, member of Syracuse Local 337 and vice-president of the AF of L Union Label Council, has been ailing for the past few weeks and has been ordered by his doctor to forego all activities for a spell. We hope it will not be long before Bill is back in harness and pitching on all fronts.

• The Wage Stabilization Board heard arguments recently on behalf of the Hollywood AF of L Film Council and its affiliates (including the IA, American Federation of Musicians, and the American Federation of Radio Artists) that wages in the motion picture industry should not be frozen since no controls exist over theater admissions and film rentals. Robert W. Gilbert, representing the film unions, told the Board that the Defense Production Act of 1950 does not authorize wage controls in industries exempt from price controls. "If this panel cannot find an express authorization for regulation," said Gilbert, "then the panel must resolve that doubt in favor of no regulation."

The panel, headed by Chairman Theodore Kheel, includes two labor members, one of whom is Woodruff Randolph, president of the International Typographical Union. Findings and recommendations on the problems of wage stabilization in the industries exempt from price ceilings will be made after further study. Industries exempt from price control are motion pictures, railroads, communications, trucking, insurance, public utilities, real estate, airlines, local transit companies, newspaper printing and publishing, radio broadcasting and television.

• Some 30-odd years ago, when we were financial secretary of New York Local

306, our sidekick at that time was Joe Hornstein, who was the union treasurer. "Hoboken Joe," as he was known to his fellow projectionists, was extremely popular with his brother craftsmen. When he founded the Joe Hornstein Motion Picture Theater Supply Co. some years later his success was assured from the start. Joe's sudden death last month was a shock to his many friends in and out of the motion picture industry. His business interests will be carried on by his three sons.

• More than 1300 delegates attended the New York State Federation of Labor Convention, held last month in Buffalo, N. Y. This is a record attendance in the history of the State organization. The meeting followed the annual 10th District Convention, and many of the IA delegates remained for the State Federation conferences.

William Green, president of the AF of L, and George Meany, AF of L secretary-treasurer, were among the speakers. Ralph Wright, U. S. assistant secretary of Labor; Charles Halloran, president of the Buffalo Federation of Labor, and Harold C. Hanover, secretary-treasurer of the N. Y. State Federation of Labor also addressed the gathering. Topics discussed by the various speakers included the Taft-Hartley Law, the Hughes Brees Unemployment Insurance Law (see IP for May, 1951, p. 17), and Communism. Needless to say, these topics were subjected to considerable criticism and were roundly denounced by the speakers and the delegates.

Among the IA men present at the State Federation meeting were IA President Walsh; James J. Brennan, IA 4th vice-president; H. Paul Shay, 10th District secretary; J. C. McDowell, Solly Pernick, N. Y. Local 1; Herman Gelber, Edward Stewart, N. Y. Local 306; Tom Murtha, Brooklyn Local 4; Tom Brogan, Auburn L. 119; Kenneth Bassler, Niagara Falls Local 121; Donald Rood, Utica Local 128; Bert Ryde, Buffalo Local 233; Fred Boekhout, Rochester Local 253, Ralph Halloran, Elmira Local 289; Edward Wendt, Albany Local 324; George Raaflaub, Syracuse Local 337; Earl Tuttle, Binghamton Local 396; John Short, Corning Local 480; and Gerald Henderson, Batavia Local 581.

• William Monroe, Jr., 52, and Frank K. Carlin, 59, members of Atlantic City Local 310, died recently within 10 days of each other. Monroe, who was financial secretary-treasurer of the Local, succumbed to a heart attack on June 26; and Carlin, a charter member of the Local, died July 5 from a stroke suffered two weeks earlier. Both men were veterans of World War I.

• Recent out-of-town visitors to the offices of IP included Walter Roberts, Local 178, Salisbury, N. C.; Mike Ostrowski, Local 233, Buffalo, N. Y.; James Manion and Charles Serkes, Local 143, St. Louis, Mo.

• Jake Pries, former secretary and business representative for Atlanta Local 225, informed us that his son, Ralph, presented him with a third grandchild—a girl. Young Pries formerly managed the Philadelphia branch of the National Theatre Supply Company, and is now associated with the Berlo Vending Machine Co.

• Existing and projected employe benefit plans in the motion picture field look a little pallid when compared with the following example of enlightened business management:

Eastman Kodak employes leaving for military service receive a special allowance equal to four weeks' pay if with Kodak a year; two weeks' pay if with Kodak six months. If eligible for a vacation at the time he enters service, he will receive his normal vacation pay.

His group life insurance will be continued for a period of six months after he leaves; it will be put back into effect immediately he returns to Kodak. He will receive a wage dividend payment in the year subsequent to leaving, the amount to be about the same as if he had not been away. On rejoining Kodak, his eligibility under various Kodak plans will be the same as if he had not left. Time spent in the service will be counted toward his service record. He will be credited with retirement annuities for the time he is in service.

Kodak will assume, on a year-to-year basis, the cost of family hospitalization, if such a contract were in effect at the time of departure for military service.

• We were saddened to learn of the recent death of Charlie (Sheriff) Hunt, 74, member for over 50 years of Detroit Local 38. Charlie was a charter member of Local 38 and worked in many of Detroit's theaters until about a year ago, when he retired because of ill health. Many stagehand and projectionist road men will remember Charlie as the stage carpenter at the Gayety, Avenue and Palace theaters.

• Little Rock, Ark. Local 204 celebrated its 40th anniversary with a dinner-dance at the Hotel Marion, Little Rock. About 175 persons participated in the affair, which was one of the most successful ever held by the Local. Representing the IA were General Secretary-Treasurer Wm. P. Raoul; Charlie Hathaway, IA representative and business representative of Oklahoma City Local 112, and Al S. Johnstone, New Orleans Local 293, representing President Walsh, who was unable to appear. Acting for the Local, Raoul presented charter members J. B. Cowpland and Noel Withrow with diamond lapel pins.

Sam M. Wassell, mayor of Little Rock, C. K. Call, State labor commissioner, and S. P. Dixon, deputy labor commissioner, were among the invited guests.

• The 7th District held its annual convention last month at the Henry Grady Hotel in Atlanta, Ga. N. L. Liggett, president of Atlanta Local 225 was the presiding officer. Gov. Herman Talmadge, G. Simons, representing the mayor of Atlanta, Henry W. Chandler, president of the Atlanta Federation of Trades, and J. B. Pate, president of the Georgia State Federation of Labor were among the prominent speakers. A banquet in the Dixie ballroom of the Henry Grady Hotel closed the sessions.

• The Tri-State (Pennsylvania, West Virgina, and Ohio) Association held its 27th annual meeting last month at the Elk's Home in New Kensington, Penna. F. P. (Reel) McCoy, secretary of New Kensington Local 444, was unanimously reelected secretary of the Association. President Walsh and other top IA executives addressed the meeting.

Among the guests of honor were Harry J. Abbott, 8th IA vice-president; Lawrence J. Katz, IA representative; N. Williams and Harry Russell, National Theatre Supply Co.; Tom Cocklin, National Carbon Co.; and Frank Hamre, Radio Corp. of America. Delegates from Pennsylvania Locals included Paul Ferry, William and Luther Thompson, Pittsburgh Local 171; Emory Myers, York Local 283; Sam Rubin, Harrisburg Local 488; Roy Bryan, Altoona Local 130; Wm. McClay, Uniontown Local 208, and Frank Karalfa, Johnstown Local 561.

Supply Dealers Sign For Altec Service

With the continuing expansion of electronic developments in the motion picture industry, theater supply dealers are becoming acutely aware of the need for qualified sound engineering advice, reports Altec Service Corp. Latest to join the Altec fold is Ringold Theater Equipment Co., Grand Rapids, Mich.

Renewal agreements for Altec service were signed recently by GerOBar, Inc., Indianapolis; Ohio Theater Supply Co., Cleveland, and McArthur Theater Equipment Co., Detroit.

Tv Set Implosions Negligible

When Tv was new, there was a great deal of fear that picture-tubes would implode and do damage and injury. But to date, after 15,000,000 sets have been in use, there are authenticated cases of only one or two actual "implosions." So the hazard ratio seems almost negligible.

Wide Technical Gains in 1950

*SMPTE Progress Report Details Film, Tv Advances**

PROGRESS in the motion picture studios during 1950 was highlighted by the advances in various color systems and the apparent acceptance of color for pictures of all classes and types. The taking speed of the Technicolor system has been increased considerably. Several laboratories within and without studios, have been remodeled to handle the various other color systems which are now in active use.

The drive for production economies continues and a number of different things have been tried with varying success. During 1950, radio communication facilities were used extensively between studios and location units, as well as for the control of production personnel and equipment. The F.C.C. allocated radio channels to the motion picture industry specifically for this purpose. Closer pre-picture planning among the production groups, resulting in the reduction of shooting-days per picture, has probably been the greatest money-saving factor.

100-Theater Light Survey

In picture and sound reproduction the work of the Screen Brightness Committee has created a great deal of interest among studio personnel, and the results of the 100-theater survey promise to bring about a better relationship between negative density, print density and average projection light.

The various Tv broadcasters are continuing with the policy of moving into studios where space limitation is not such a serious factor.

The use of motion films in Tv has grown steadily throughout the year. Already a considerable number of shows are being filmed, and there are indications that the majority of the sponsored shows may eventually be broadcast from film. Much of this shooting is being done by independent producers, but with increased studio space some Tv companies are preparing to film their own productions.

35-mm Photography Advances

Zenith Phonevision system has been undergoing a consumer test with the permission of the F.C.C. These tests have used 35-mm films produced for theatrical release. The prints have been regular color releases, or regular black-and-white releases, as well as special black-and-white prints made to Zenith's specifications of density and contrast.

By July of 1950 conversion to safety film was approximately 85% complete. Eastman discontinued the manufacture of 35-mm nitrate positive film for motion pictures. Some Eastman safety stock is being used by Du Pont pending production of a suitable safety stock by the latter company.

The Eastman 35-mm negative-positive color process, introduced experimentally in 1949 has now been used in a number of full-length pictures.

Intense Color Activity

One studio is shooting pictures with Eastman color negative, viewing dailies on Eastman color positive, and will release on SUPERcineCOLOR three-color print stock.

A second studio has made a feature picture on Eastman color negative and will release on Du Pont color print stock.

Another studio is shooting a feature picture on Ansco negative-positive and is doing all of the processing in the studio.

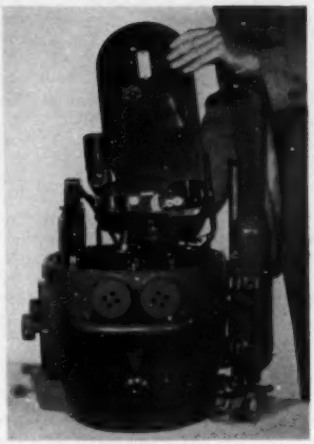
Other studios are preparing to produce some of their own color films by any one or more of the aforementioned processes, or by shooting on black-and-white stripping film and using the three-color separations for printing on any one of the print stocks.

Cinecolor Laboratory Report

In laboratories in the color field, Cinecolor Corp. reports the following:

(1) Installation of equipment and production processing of the Eastman color negative film.

(2) Installation of equipment and production processing of the Eastman color positive film (with sound).



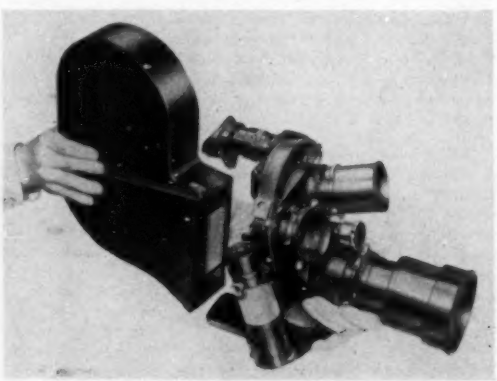
The Aquaflex underwater photographic unit.

(3) Full scale conversion for the SUPERcineCOLOR three-color release printing.

Consolidated Film Industries has equipped both its Fort Lee (N. J.) and Hollywood laboratories for production of Trucolor. The company is now in release production of the new three-color Trucolor prints. The print stock is Du Pont three-color material type 875, and the original negative is the Eastman automatic masking three-color film type 5247.

The sequential operations are: three separation prints on panchromatic film from the color negative, three duplicate negatives optical effects incorporated, on gray base stock through selective filters from these prints which are then printed through proper filters for layer selectivity, on the multiple-layer Du Pont print stock.

Du-Art Laboratories in New York will



Eclair "Cameflex" takes 35-mm and 16-mm film interchangeably by changing film magazines.

*J. Soc. Mot. Pict. & Tv Eng., May 1951.

make "Tri-Art" color on Eastman, Ansco, and Du Pont color materials.

Technicolor is at present working with films for the three-strip cameras which are balanced for a color temperature of approximately 3350 K. It is claimed that this system will bring illumination requirements within the range of that now used for black-and-white photography. The system will be available for general use within a few months.

Lighting Equipment, Techniques

Technicolor announced a change in color balance of the three-strip system from that of sunlight to a color temperature of approximately 3350 K. This resulted in the production of gelatin-type filters for the carbon-arc lamps to reduce their color temperature sufficiently for them to operate in conjunction with unfiltered tungsten lamps.

This change is at present in the transition stage. Some time ago the Technicolor system was increased in speed by a ratio between 450 ft-c and 300 ft-c key-light on a white light, or sunlight, basis. Later, by going to a 3350 K basis, a further increase in speed to 150 ft-c was announced. This latter increase in speed is, however, applicable only to incandescent tungsten lamps, because it is necessary to filter the high-intensity carbon arcs by approximately the amount gained in order to provide a color balance.

At the time of completion of this report only tests and picture sequences have been completed with the 150-ft-c system balanced for 3350 K. Productions have been made with the 300-ft-c white light system.

While no mercury-cadmium lamps are in present use for set lighting in the West Coast studios, the bulbs are available and are being evaluated.

Reflector-type incandescent bulbs, such as photoflood and photospot lamps, have been increasingly used on location where the documentary type of lighting is indicated and for non-theatrical releases.

Cameras and Accessories

A system for special effect shots has been devised and applied at present to panning and tilting the camera, which permits the cameraman to pan and tilt the camera in a normal manner and follow the action as desired. A record is made of the movement and, for subsequent exposures on the same film, the record controls the camera movement, matching the original relation between the camera position and picture frame during these subsequent shots.

In France, two new lenses were announced. "Retrofocus," a very short focus lens designed so as to permit attachment and use on normal 35-mm cameras, and "Erax," a highly corrected lens developed by Société Kinoptik in which the graduation of the aperture of the diaphragm is proportional.

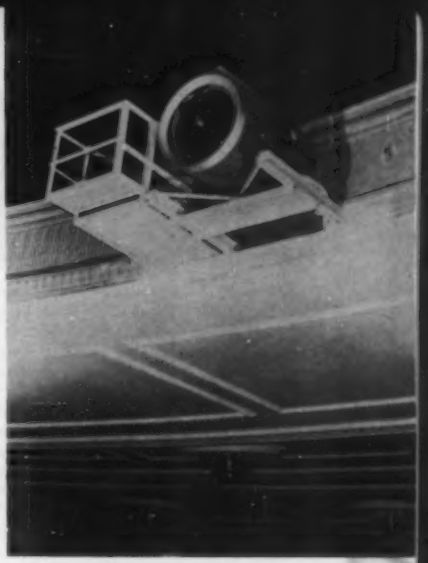
The Eclair Camerette, introduced in the U. S. from France in 1949, now has a companion model, the "Cameflex," which takes 35-mm and 16-mm film interchangeably.

Navy's Underwater Photography

The "Aquaflex" was introduced in the U. S. in 1950, the first one being used by the U. S. Navy. Essentially, it is a standard 35-mm Camerette with a specially designed magazine in an underwater blimp which permits external stopping and starting, speed control, focus and diaphragm changes.

A compressed cylinder attached to the underwater housing, working on a demand valve, maintains an internal pressure of 3 psi above the external pressure, irrespective of the depth to which the camera is submerged. Stabilizing fins allow the camera to be moved through the water smoothly. The camera and housing weigh about 100 lbs. when out of the water.

Great flexibility of operation is attained by using diving equipment with self-contained air supply for the operator. While propelling himself and the camera by means of swim fins attached to his feet, the cameraman, unaided, can maneuver the camera and operate aperture and focus controls. Smooth travel shots, following divers or native fish down to a depth of 80 ft., have been shown before the Society.



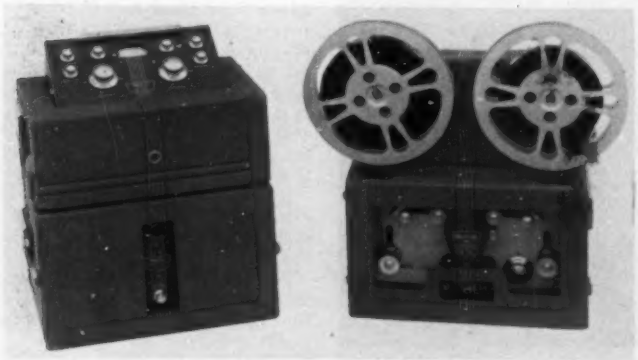
RCA theater television projector mounted on front of theater balcony.

35-mm Sound Recording

The year 1950 has seen noteworthy progress in the application of magnetic recording to motion picture production. The extent of the application has varied among the producers from cautious planning and preliminary experimentation, with the view of future conversion, to complete conversion to magnetic recording on all production and music recording work.

While many advantages with respect to quality of production, maintenance and operation of equipment, and conservation of film raw stock accrue from the use of magnetic recording, the overall recording operation, from the original recording of dialogue and music to the production of the final release print, has been considerably complicated. As a result, many of the extensive claims of great economies to be effected by the use of magnetic recording have been considerably modified, and conversion programs are now more in the nature of plant modernization.

The great demand for smaller and lighter portable equipment for location, has been, possibly, the strongest influence in affecting the choice of magnetic recording, as magnetic-recording



The Westrex portable magnetic sound recording system, introduced recently.

equipment has been the answer to this problem.

Various Magnetic Applications

Since April 1, 1950, all Paramount production, both in the studio and on distant location, has been done on super-portable recording channels, weighing 65 lbs. and using 17½-mil recording stock.

New portable magnetic-recording systems for 35-mm, 17½-mm or 16-mm film, featuring compact, light weight construction, were introduced by Westrex, and are now in wide use in studios both here and abroad.

The use of magnetic equipment and re-recording has gained momentum. It has become the practice in a number of studios to record rehearsals on magnetic film. A good "rehearsal" becomes a "take" and unsatisfactory "rehearsals" are erased. The "take" can be reviewed at any convenient time and then transferred to photographic film for release printing. In this connection, a multi-track magnetic equipment has been used to good advantage.

This equipment records one, two or three tracks on the same film strip on which music, speech or sound effects, or any combination thereof, can be recorded with the same relative volume variations as they have in the finished product. The benefits of this equipment, as experienced by Columbia Studios, follow:

Summary of Advantages

Saves track storage space by a factor of about 10 to 1.

Reduces the cost of foreign versions by 50%.

Provides a ready means of furnishing duplicate release negatives as needed.

Provides a convenient source of material for Tv versions "minus music" and it provides a source from which dialogue, music and effects can be rebalanced in the dubbing of 16-mm versions.

The increased use of magnetic production recording, together with a lack of suitable means of editing this material, has resulted in the development and use of equipment to make direct-positive photographic duplicates of the magnetic recordings for use by film editors.

Re-Recording Procedure

Re-recording is being done in some studios directly from magnetic tracks, and in some, from photographic duplicates. Photographic duplicates may be either direct positives or electrical transfers to a photographic negative from which re-recording prints are made.

The Signal Corps Studios have applied several modifications to standard magnetic recording systems, which provide improved operating efficiency as well as economies in time and material. These include facilities for:

(1) Stopping, reversing and restarting recorder, recorder and projector in interlock, and (2) silently changing over from record to playback, or vice versa, while running. Thus, errors in narration and re-recording jobs may be corrected without rethreading, splicing or blooping the film. Also, this studio has perfected a method for lip-synchronous production which makes use of 35-mm magnetic loops.

The year 1950 has seen continued and extended use of nonsynchronous, sprocketless-type magnetic recording equipments, particularly in the field of radio transcription. There have been a number of schemes that have been developed to make these equipments operate synchronously with picture film for use in Tv and for cue-track recording.

Last year also saw the use of low-shrinkage safety-base film extended to sound recording. By the end of the year practically all photographic recording was being done on acetate-base stock.

16-mm Photography, Recording

Ansco has marketed a new 16-mm color duplicating film. Ansco's new film Type 238 is designed for making duplicates with soft gradation color originals.

Eastman Kodak 16-mm television projector, Model 250, in one self-contained unit.

The Naval Ordnance Lab. has developed techniques in the high-speed photography of underwater explosions. Pictures ranging from 2,000 to 3,000 frames/sec have been made of explosions of charges up to 1 lb., at depths down to 2 miles.

Early in 1950 a new 100-ft.-film capacity, 16-mm, single-system sound-recording camera called the "Cine-Voice" was introduced by the Auricon Division of Berndt-Bach, Inc., of Hollywood, Calif. It is available with a galvanometer for recording either variable-area or variable-density high-fidelity sound track to SMPTE Standards.

The camera weighs only 12 lbs. and the entire equipment, including amplifier, microphone, cable, headphones, accessories and carrying case, weighs 34 lbs. It operates from either constant speed or synchronous motors. A portable power supply to drive the camera from an ordinary 6-volt storage battery is also available.

16-mm Magnetic Recording

The RCA type RT-11A magnetic tape recorder was built for professional service and is being used widely in the broadcasting and Tv fields. It has also found limited acceptance in motion pictures for recording projection takes.

Comparatively little use was made of 16-mm magnetic film, although recorders were available.

Reeves Soundcraft Corp. introduced a service for edge-coating 16-mm raw stock or developed film with magnetic material to permit the use of magnetic sound tracks with 16-mm prints. Excellent sound reproduction from such prints was demonstrated, using a modified projector.

J. A. Maurer, Inc., demonstrated a new multiple-track 16-mm sound-recording system that reduces distortion resulting from nonuniformity of the projector sound-scanning light beams.

35-mm Film Sound Reproduction

The activities of the Screen Brightness Committee in obtaining accurate information on a group of 100 theaters throughout the country has already had an effect on the motion picture studio laboratories, where the preliminary information is being used to determine if changes should be made in print density.

In at least one studio it was found desirable to increase set lighting levels slightly in order to improve the projection quality of the prints.

This work promises to bring about a much better correlation between production and exhibition both as to print quality and projection conditions.

At least two new mirror-type carbon-

(*Continued on page* 26)

TELEVISION developments of particular interest to the motion picture theater field during the past month were so numerous and varied as to leave both the Tv broadcasters and theatermen in a continual dither. Unfortunately for the theater field, not all the happenings were on the right side of the ledger. To recap:

The second closed-circuit telecast of a boxing match between Jake La Motta and Bob Murphy was made to 11 theaters in 9 cities and was a box-office wow. Within a few days after the bout RCA reported that orders for large-screen theater Tv units were coming in "from left and right" and that the year-end goal of 100 installations appeared a certainty.

200 Equipments On Order

RCA now has 200 theater Tv orders on hand and estimates that within six months the total will exceed 400. A warning note was sounded by a Loew executive, who said: "Still to be answered is the question of what will happen when more than one theater in a locality has the facilities to carry such sporting events. Full houses are not likely to be the rule when that happens."

On July 12 the theater Tv showing of the Rex Layne-Rocky Marciano bout was also a box-office bonanza.

Bad news for theaters was the request of the Society of Independent Motion Picture Producers for FCC approval of subscription Tv—that is, a pay-as-you-see service. Precedent is the FCC denial some years ago of subscriber-fee radio programs.

Actors Guild Makes Move

The Screen Actors Guild will enforce the clause in its basic contract with the studios which bars the showing on the air of any film made after Aug. 1, 1948.

Leaders of the Theater Owners of American and Allied States, which have been at odds as to which band of the spectrum to press for at the FCC hearings on allocations set for Sept., finally agreed to request UHF channels.

Cowboy star Roy Rogers obtained a temporary injunction preventing Republic Pictures from disposing of 78 films to the Tv networks.

An Exhibitor Point of View

Abram F. Myers, board chairman and general counsel for Allied States exhibitors, observed: "The stampede toward large-screen Tv is only natural, but there remain several vexing questions as to the ultimate effect of theater Tv, particularly as it may affect the standing of the theater in the community.

"The cost of a television installation is very high," he pointed out. "There is a dearth of first-class fighters. The attitude of other sports toward theatre Tv has not crystallized. The public reaction to having to pay for programs which were promised for free remains in doubt.

"The ultimate effect on regular movie attendance is not known. And, of course, there are still the same old uncertainties as regards systems and channels." Mr. Myers emphasized the possible danger of "turning theatres into prize fight arenas from time to time.

"One cannot escape wondering what typical movie-goers—say parents, persons of refinement and children—will think of such goings on. Will they be willing to space their movie-going to avoid these brawls, or will the theatre lose caste in their estimation? The experience would hardly endear the theatre to them as a place of polite entertainment."

Also, the Allied official continued, as soon as the fight ends the audience rushes for the exits "leaving the theatre empty and exposing motion pictures to an unwarranted humiliation." He cited the lack of good fights and the possibility of eventual complaints to the FCC.

Out of the welter of events emerged the firm conviction by well-informed motion picture men that the greatest menace to the film theater box-office still is the possibility of FCC approval of pay-as-you-see Tv programs sent into the home. The tremendous revenue obtainable from such a system would make it unnecessary to obtain advertising sponsorship of programs.

GPL's 'Simplex' Direct-Projection Theater Tv. System for Distribution by National Theater Supply

FURTHER impetus to the rapid expansion of theater Tv was supplied by the announcement (July 9) of a direct-projection system designed and manufactured by General Precision Laboratory for distribution through National Theatre Supply Co. Orders for this new unit, to be known as the Simplex Theater Tv System, are now being accepted for late Fall delivery.

An outstanding feature of this system is an improved mirror design which gives a balanced light distribution over the entire screen. GPL promises that the trade showing scheduled for early August will reveal that the system delivers illumination at the corners of the screen in the ratio of 80% of that at the center, the eliminating "hot spot" center glare. Overall definition is rated as excellent over the entire screen area.

Simplex Tv Technical Data

The projection tube has a suspension mounting that permits removal for cleaning without disturbing the positioning adjustment. The tube is suspended from the top of the barrel, and the tube mounting bracket may be removed through the top with the tube in place. All adjustments and controls for the barrel are at the top, easily adjustable without using ladders or catwalks.

A re-circulating system for cooling the optical barrel, rendering it dustproof, is provided. The same cooling system controls the humidity in the barrel and eliminates arc-over of high voltage. Tilt of the barrel is not limited in any way, since all cabling, including

Whose Ox is Gored?

The *Kansas City Star*, powerful midwest newspaper, attacked the exclusive theater telecasting of boxing matches, declaring that "the families owning 13,000,000 Tv sets have a right to feel cheated at being denied the pleasure of a sports program which otherwise would have been brought into the homes of most of them."

Admitting that there was no contract to this effect when the Tv sets were bought, the *Star* said people "assumed" they would be able to see as well as hear the major sports events.

This, from a representative member of the national association of newspaper publishers which, when radio was burgeoning, tacitly agreed among themselves not to publish radio program listings because it might hurt *their* business.

The advertising-free theater Tv presentations, requiring no aspirin, are as a breath of fresh air compared with the nausea-inducing columns of any metropolitan newspaper.

high-voltage lines, comes in through a single junction box in the rear of the barrel. The barrel itself has a three-point suspension. Thumb screws permit easy adjustment, with a positive lock when positioned.

The 80 Kv power supply is compact, light and easy to install. It utilizes a new type of flexible high-voltage cable so that the installation site of the power supply may be as far removed as is necessary. It is assumed that the power supply will be installed in the theater projection room.

Projection Throw, Screen Size

The system includes a high-quality receiver for off-the-air reception. It also accommodates inputs from microwave or coaxial feeds. New circuit designs provide greater reliability and extreme flexibility, while using fewer tubes and other components. All circuits are protected by a "fail-safe" design: failure of one component cannot cause failure or injury to any other component.

With the preferred throw distance of 65 feet, a picture 20 x 15 feet is obtained. However, the system may be operated over a wide range from 32 feet and an 8 x 10 picture on up to 80 feet and a picture approximately 25 x 19 feet.

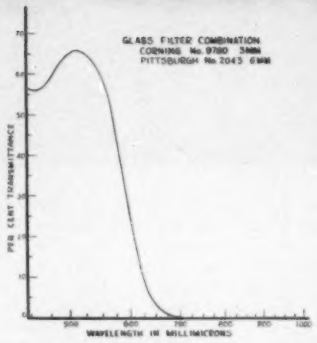
Merchandising details for the system have not been announced, but National Theatre Supply Co. states that the system will be "competitively priced." Service will be provided by Altec Service Corp. GPL will continue to make available its film-relay theater Tv system which was successfully demonstrated last year.

Filters in Tv Projection

A MARKED improvement in television picture quality from 16-mm motion pictures has been obtained by using optical filters which prevent the red and infrared radiation of the projection beam from falling on the iconoscope mosaic. The bias light is also filtered, which prevents the red and infrared illumination from falling on the back of the mosaic and inner walls of the iconoscope.

The greatest improvement is obtained when a tungsten light source is used, but a marked improvement is noticeable when the filters are used with a carbon arc source.

A series of filters were used for experimental purposes between the condenser system in the projector that removed all the radiation beyond 560, 590, and 620, respectively. It is recommended that for the present a Pittsburgh heat-absorbing glass, No. 2043 (6 mm thick), plus a Corning No. 9780 or 9788 (3 mm thick) be used in the Eastman Model 250 Tv projector.



Curve showing transmission vs. wave-length for combination glass filters for Tv projection.

This combination of filters reduces the light on the iconoscope mosaic to the 10% point at 590 millimicrons.

Substantial Improvement Cited

The improvements in reproduced Tv pictures by the use of these filters are as follows:

1. It reduces the over-all haze or veil characteristic of a Tv picture.
2. It prevents difficult shading problems with scene changes.
3. It increases contrast and resolution and gives an increased brightness range or tone scale that can be reproduced.
4. It prevents edge flare.
5. It reduces highlight saturation.
6. It increases video signal. When the filters are inserted, there is a reduction in light on the iconoscope mosaic of approximately 30%. However, there is an increase in video signal of approximately 20%, as indicated by the oscilloscope in the master monitor.

The filter used over the bias light is a 2 by 2 inch by 3 mm Corning No. 9780 or 9788. The use of this filter gives an increased video signal and reduces the projector shutter pulse to a minimum; that is, the signal light transient caused by the short, bright application of light to the iconoscope mosaic.

Commercial Color Usable

The addition of these filters to the projection beam in a Tv projector with adequate light output and to the iconoscope bias light will allow the Tv stations to use commercially available color prints as program material without an undue sacrifice of picture quality, as there has been heretofore.

It also enables the projectionist to focus the picture sharply on the mosaic because of the reduction in scattered and reflected light from the face of the iconoscope. It reduces the heat at the motion picture projector gate to a minimum so that a single 16-mm frame may be held stationery in the projector gate and may be projected onto the iconoscope mosaic for thirty minutes without excessive heating and distortion of the film, which would cause the image to go out of focus

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Hanover Carbon Burner

The Hanover Continuous Carbon Burner, rated as effecting carbon savings as high as 25%, has been introduced to the trade by Norpat Sales, Inc. Warranted to burn any Suprex-type carbon down to the last inch, this new burner replaces the existing positive carbon jaw with a new type of great accuracy. The automatic action is designed to provide a new pre-heated carbon when the stub has burned down to a predetermined size, with no disruption in or loss of light. The burner has adjustments for warped carbons.

The Hanover does not have to grip the carbon at its end, thus carbon guides may be eliminated to accomplish a fuller distribution of light from the reflector into the aperture. Electrical resistance decreases and arc voltage changes with shortening of carbons due to consumption. Thus the use of the shorter clamping length steadies the arc noticeably.

Precision-built and wholly automatic in operation, with no parts to wear out and thus no maintenance cost, the Hanover burner may be installed quickly and easily by projectionists.

Norpat's merchandising plan includes a guarantee for five years, with free replacement of any part worn due to normal use. Distribution mainly through projectionist agents in planned. Full details are available from "Doc" Faige, at Norpat, at 43 West 45th St., N. Y. C., 19.

Vallen Thrives on Restrictions

Faced with the problem of reducing the quantity of critical materials used in their Aero Speed Curtain Control, Vallen, Inc., of Akron, Ohio, has actually increased the efficiency of the unit by complying with government restrictions.

The new Control is smaller and more compact than the former model, differing completely in basic construction and appearance. There is actually less mechanism, fewer parts to get out of order, and almost no possibility of breakdown. By scaling down the design, Vallen will be able to supply a dependable control of the precisely correct capacity for any installation, thus eliminating the need for over-capacity units.

Safety Switches Important; Don't Neglect Them

ONE urgently needed new habit, indispensable in dealing with Tv equipment, should be formed by projectionists now before such equipment appears in the theatre. A large majority of projectionists appear to have a certain contempt for the dangers inherent in handling live circuits. The practice of disregarding safety switches with which careful manufacturers equip sound apparatus, is widespread. As a matter of fact, some projectionists in their eagerness to handle "hot" circuits, jam these switches, nullifying the manufacturer's precaution.

These projectionists know very well that ordinary lighting voltage has killed many persons; that people have been killed repairing common household radios. But these things do not happen very often, therefore a complete disregard for the 300 to 900 volts that may be found in a sound amplifier has become increasingly common—and a great many men have developed a positive habit of disregarding electrical dangers.

Tv Unit's Exacting Demands

That will be a sad habit to carry over into the days of Tv, when working potentials can be expected to run between 60,000 and 100,000 volts. Of course, such voltages will be surrounded by precautions built into the apparatus by the manufacturers; but the projectionist who today deliberately put out of action the safety switches of their present apparatus probably will carry over that tendency in dealing with the safety gadgets surrounding 100,000 volts. Especially when the show stops suddenly and a man rushes to his apparatus to do something about it quick, old-established habits will tend to carry over.

The time to form new habits is now.

Every projectionist knows that he should open switches and bleed condensers before working on electrical circuits. He also knows that he should form the habit of doing that *always*—even with circuits that are not very dangerous and even when his show has stopped. Every projectionist group should foster the development of correct habits in handling electrical circuits among its own members. The formulation of such a good habit will stand the craft in good stead now and in the future.

Altec's Role in Theatre Tv is Spelled Out by Bessey

Altec Service Corp. intends to play a very important role in the development of theater Tv, according to an announcement by Harry M. Bessey, executive vice-

more B.A.*

*(BOXOFFICE APPEAL)

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president. Emphasizing the fact that Altec is the only independent service company operating on a national basis, and with a backlog of diversified experience in all branches of the electronic art, Bessey said that the combination of manufacturing, development and laboratory facilities with a trained national service group adds up to a technical know-how that could never be matched on a local basis.

Altec has already reached an agreement with National Theatre Supply Co. to supervise and service installations of the GPL Simplex Tv system. Negotiations with other manufacturers are now in progress.

Close cooperation with projectionists, said Bessey, is a major aspect of the Altec program.

Westrex-Reeves Magnetic Film Deal

Westrex Corp. and Reeves Soundcraft Corp. have completed negotiations under which Westrex will distribute on a world-wide basis the complete line of Reeves professional magnetic recording films. This includes not only the standard 35-, No. 17½-, and 16-mm full-width magnetic-coated film used in original recording, but a new product "Magna-Stripe" a narrow strip of magnetic material coated on clear motion picture film base intended for use in the editorial departments in the professional motion picture field.

These films, available at 100 Westrex offices throughout the world, offer numerous distinct technical features, one of which is footage edge-numbering of the film.

Joe Hornstein, Pioneer Supply Dealer

Joe Hornstein, pioneer projectionist and theater equipment supply dealer, died on June 19 of a heart attack suffered at his New York City home. He was 65 years of age. Starting as a projectionist in 1903, Hornstein soon entered the supply field. First as general manager of the old Howell Cine Equipment Co., then with National Theatre Supply, and later as head of Continental Theatres Accessories (Warner Bros. subsidiary), Hornstein became one of the best known equipment men in America.

In 1934 the firm of Joe Hornstein, Inc., was formed, and it now has three branches—New York, St. Louis, and Miami. Hornstein was a member and former treasurer of IA Local 306, N. Y. City, and a member of the Odd Fellows, Masons and Motion Picture Pioneers. He is survived by his wife, three sons, and a sister.

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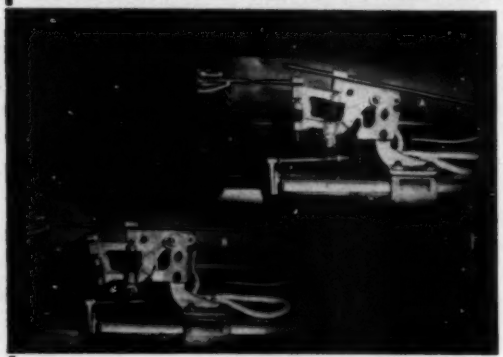
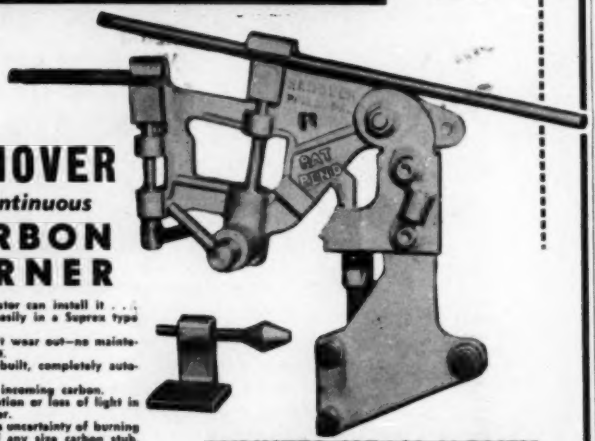


A—Stub in burning position.

B—Stub burned down to the last inch — new carbon finishing reel.

Both Peerless Magnarc Mounting.

Below: Strong Mogul Mounting.



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Carbons which still have from 2 to 15 minutes "burning life" but are too short to take a chance with, now can be used right down to the last inch . . . *without loss of light . . . without risk!*

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against inferior materials and workmanship and against normal wear and tear.

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You have 5 days from the time you receive the unit to install and test it thoroughly. It costs you nothing to prove it!

OTHERS BEFORE YOU HAVE PROVED IT
One theatre burned stubs for 2 days . . . proof of "true" economy! Ellis Theatres of Philadelphia tried one and ordered 25 . . . "true" economy proved!

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TECHNICAL GAINS IN 1950

(*Continued from page 22*)

arc projection lamps have been described. These units feature fast optics, arc-positioning devices, forced air control of exhaust gases and new methods of automatic arc control.

In the field of control of heat in the projection optical train, there have been a number of installations of units with heat-absorbing glass filters and others with compressed air blowing against the film. In addition, considerable work is being done experimentally and in field tests with treated mirrors and optical train filters of the interference type.

A new all-plastic screen made of Firestone "Velon" plastic and known as RCA Snowhite Evenlite vinyl screen made its bow. The material is 0.012 in. thick, weighs 1/9 psi and is said to be sag-proof. It is pigmented with titanium dioxide and surface embossed for high efficiency and diffusion. It is also flameproof, mildew proof and unaffected by heat, cold or moisture. The surface is rugged and can be cleaned by washing, soft brush or vacuum cleaner.

A new Walker high-intensity screen is made of plastic in which no vinyl is used. The metallized surface is made up of elliptical forms which spread the light fanwise to control reflection. It is recommended for theaters with wide-angle viewing conditions, but with no more than a 12-deg. projection angle. It is claimed that the control of stray

light improves contrasts and results in better apparent definition.

Cinerama, a system of exhibiting three frames of film in a curved panorama, has been demonstrated. It is stated that, while the inventor does not claim stereoscopic results from a strictly technical standpoint, the effect is one of super reality. The system includes the use of several sound tracks for projection of stereophonic sound.

16-mm Film, Sound Reproduction

1950 has been a year of marked improvement in the whole 16-mm process, inspired mainly by Tv. A number of professional-type 16-mm projectors have been made available, with performance approaching 35-mm standards.

Eastman announced and demonstrated a heavy-duty 16-mm professional projector which uses the same type of intermittent sprocket movement as in 35-mm professional projectors.

International Projector Corp. has described a sturdy, high-quality 16-mm projector designed to meet U.S. Navy Bureau of Ships Specification CS-P-41A.

Mitchell Camera Corp. announced a new "giant" 16-mm professional projector which offers optional high-intensity carbon arc or incandescent lamp illumination. It was designed to function with standard 35-mm sound equipment.

Big Navy 16-mm Program

Approximately 1,400 16-mm sound motion picture projectors, built to comply with the high performance required by the Joint Army-Navy Specification JAN-P-49, were put into service by the armed forces during the past year. The Navy is employing these projectors to evaluate and accept all 16-mm prints procured by the Navy.

The prints are screened with both lead sulfide- and caesium-type photoelectric cells to insure that there will be no material difference in sound reproduction when the prints are presented to the Fleet on either type of equipment.

Television 'Comes of Age'

Many people have said that Tv came of age in 1950. There is considerable truth in this statement and it may be traced largely to the fact that the industrial companies of America have recognized Tv's tremendous sales appeal and have consequently devoted large sums of money to the production of shows intended for release in many cities throughout the nation.

It has been possible to cover many of these cities, and consequently a large percentage of the Tv audience, with live programming via the facilities of A.T.&T. The so-called nonconnected cities are still covered by the use of video recordings, the quality of which has improved

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greatly during the period covered here.

The availability of higher budgets has allowed the Tv networks and studios to use more care in production techniques and staging. Notable improvements have resulted, for example, in lighting, costuming and make-up, the use of process screens, and in a general recognition of how the limitations of the system must always be carefully considered in the staging of a studio production.

The marked change in Tv has required a great expansion of many Tv stations and studios throughout the country. There seems to be a trend toward more and more space, and the industry has concluded that facilities at least approaching in size those of the motion picture production lot will ultimately be required. There have been several purchases of large acreages on which numerous buildings will operate in order to handle the production requirements which are foreseen.

Extensive Use of Film

Direct photography for Tv shows has increased during the year. A number of production companies have operated specifically for this purpose and with considerable success. Most such productions have been of half-hour shows, some of which have been serialized. Both 16-mm and 35-mm cameras have been employed, although the trend at the moment seems to be the favor of the latter, in spite of the fact that many Tv stations are forced later to use 16-mm reduction prints.

Of the top Tv network shows on the air at the close of 1950, approximately 20% were on film. There has been some interest in the technique of so-called simultaneous filming of live Tv shows; however, this technique still is not widely used.

The demand for special prints reflects the growing practice in the Tv industry. Most large stations on Tv networks have established standards for print characteristics which give optimum Tv quality. Background projection as an adjunct to live programming is becoming more common.

Tv Film Projection

The technique of film projection for Tv transmission has received a lot of study. A method of improving the image quality by using filters in the projector to remove infrared radiation, and by filtering edge- and bias-light in iconoscope film cameras has been proposed. As a result of the interfering effects of light level and tube variation, this procedure is still controversial.

Eastman has manufactured a new 16-mm Tv projector, model 250, which is intended to give superior performance for film chains. The projector operates on the conventional 5% application principle, but offers improved picture steadiness, brightness and definition as well as excellent sound quality. Facilities are provided for continuous projection of a single frame, or regular projection with remote operation.

Video Recording Problems

Video recording progress during 1950 has been very great. In fact, it is generally agreed that within the limits of the Tv system as established by the FCC and as further laid down by equipment limitations, the recording system can take down what is delivered to it. Phrased another way, it is conceded now that the operation inside the studio is the point where the recording is made or broken.

Unfortunately, many Tv shows are rehearsed so little that certain fundamental rules that affect the quality of a recording are violated. Whenever this is done the results are extremely unfortunate.

To be more specific, it is necessary that lighting be handled with extreme

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care. A lighting contrast of no more than 3 or 4 to 1 should be maintained at all times. In addition, since generally more than one camera is used in a Tv studio, the camera angles must be carefully observed so that lighting will be adequate regardless of which camera is in operation.

Furthermore, camera levels must be controlled in order to maintain a balance between cuts. It is much more important that this balance be observed with Tv recording than when producing a show which will be released only as a live show.

Much New Tv-Film Equipment

The sound portion of Tv recordings has been handled in numerous ways by the various studios throughout the country. Some of the best sound has been obtained through the use of tape recording which is synchronized electrically or by the use of perforated tape. Both single and double system recordings are still employed.

A new complete chain of equipment for either Tv recording or large-screen Tv projection by an intermediate film system has been developed by General Precision Labs. This equipment consists of a high-quality monitor, 16-mm recording camera rapid film processor and projector. The monitor is provided with electronic blanking for the frame-rate conversion and gradient correction circuits. The camera has the rapid pull-down required of all Tv recording cameras and a high-quality sound-recording head. The rapid film processor can be used directly with the camera or separately.

Navy's Tv Educational Program

During 1950 the Navy continued studies of Tv as a method of mass training. The psychological studies to measure the relative effectiveness of Tv training showed conclusively a definite superiority over direct classroom instruction. In the spring of 1950 the Signal Corps collaborated to present eight weeks of one-hour programs over a ten-city CBS network to reach approximately 5000 reserves.

In continuing its investigations of new Tv equipment for Navy use, work was advanced toward the final design of a prefabricated classroom which could be mass produced in time of emergency.

The Navy experiments have attracted wide attention and have helped focus the interest of educators on Tv training. The recent FCC hearings on allocations for educational television stations is concrete evidence of this aroused interest.

The first acceptable motion picture photography of color Tv kinescope images was performed by the Navy, combining techniques developed for recording of radar PPI scopes and Tv kinescopes. A modified professional 16-mm camera and a specially designed high-speed, 25-mm, F:0.7 lens were employed.

Tv Remote Presentations

The tremendous impact of Tv as a means of taking the home audience to the scene of a remote, whether it be a sporting event or another type of special feature, has been demonstrated time and again during 1950. In fact, the effect of Tv on the local audience at a sporting event has created a national controversy. The "gate" at football and baseball games has been increased, decreased and unchanged—depending entirely upon whom you talk to and in what part of the country your conversation takes place. However, that the public enjoys the telecasts of such events is without controversy.

Theater Tv Developments

In the early months of 1950, RCA completed the design of its first commercial theater Tv equipment, the Model PT-100. This is a direct-projection system employing a projection kinescope

It takes a *SPECIALIST* to Protect the HEART of Theatre TV

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and Schmidt optics. A pilot run was placed in production and twelve equipments were delivered and installed in theaters in Providence, Albany, Binghamton, Brooklyn, the Bronx, Queens Village, Chicago and Los Angeles in time for the start of the fall football season.

At the TESMA Convention in Chicago in October, General Precision Labs. announced and demonstrated an intermediate film theater-Tv equipment using 16-mm film.

United Paramount Theaters, Inc., installed Paramount's intermediate film equipment in one of its Detroit theaters just prior to the start of the football season.

The Eastern theaters have all shown a series of football games carried by the Tv broadcasting networks. In spite of the fact that the theaters were attempting to sell entertainment that was available free on home Tv, the over-all box-office results were highly favorable and improved as the season advanced.

Several theaters are using Tv news programs on a daily basis to replace a regular film newsreel. This has been very popular because of the timeliness of the news.

Exclusive Tv Program Rights

United Paramount Theaters obtained the exclusive television rights to the Univ. of Illinois and Univ. of Michigan football games and showed them in theaters in Chicago and Detroit. Attendance at these first exclusive showings was very satisfactory, with sellouts toward the end of the season.

A group of Eastern theaters is working on exclusive programming which they hope to get under way before the year is out.*

Twentieth Century-Fox secured the exclusive use of the Swiss Eidophor system for theater Tv. This system provides excellent image clarity and screen brightness and uses a high-intensity carbon arc as a light source.

* This program has already been effectuated; and recent estimates place the number of theater Tv installations at 100 by the end of this year.

U. S. Army Contract to Genarco

Genarco, Inc., of Long Island City, N. Y., makers of the Metro-Lite high-intensity corbon arc spotlight which is used extensively in the theater and auditorium fields, has been awarded a substantial contract by the U. S. Army for the development of a powerful searchlight which will outmode any spotlight made during World War II.

While the full Genarco facilities will be concentrated on the needs of the Army, its production facilities are still flexible enough to supply the needs of the entertainment field with spotlights and replacement parts for both old and new units.

CARBON ARC SCREEN LIGHT

(*Continued from page* 11)

while the larger-cored 16-mm carbon at 460 amp gives only 150 lm/amp.

This relationship is shown more directly by Fig. 5 which utilizes the data shown on Fig. 4, together with similar data calculated for the other optical speeds indicated. Here lumens-per-ampere are plotted against carbon diameter for each of four different optical speeds. Each curve is represented as a band, including the extremes in current efficiency encountered with each carbon size. Here again, the higher current efficiency of the small-diameter carbon is confirmed for each of the optical speeds investigated.

The data so far have been concerned only with current efficiency, and if this

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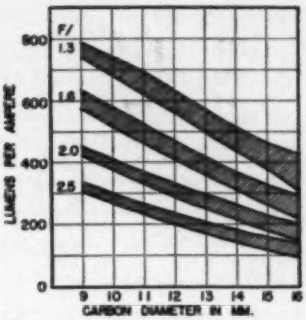

FIG. 5. Current efficiency in screen-light production.

were the only criterion, the smallest possible carbon would always be chosen for a given job. However, no consideration has yet been given to the screen-light distribution ratio, the burning rate of the carbon, or the color uniformity of the screen, all important factors in making a choice in any particular situation.

Size vs. Light Uniformity

Figure 6 shows the variation in screen-light distribution ratio with carbon size, at the same optical speeds previously considered. Here the decided improvement in screen-light uniformity with increasing size is effectively demonstrated, particularly as the optical speed increases to give a steeper slope to the curve. The data shown in Fig. 6 represent the average for all the carbons tested, individual values showing some scattering around these curves, but not sufficient to invalidate the general trend.

It should be pointed out, however, that, contrary to the general indication of Fig. 6. all 9-mm carbons, for instance, do not yield a lower screen-light distribution than all of 10-mm size. In fact, the reverse is sometimes the case in practical service comparisons. Different ratios of

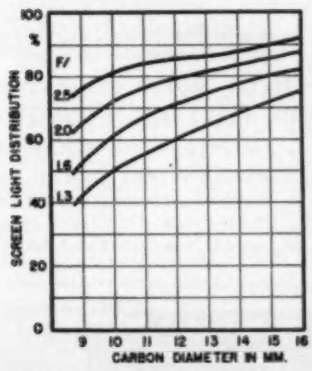

FIG. 6. Screen-light uniformity; side-to-center brightness ratio.

core-to-shell diameter, different methods of construction and burning, all contribute to the scattering previously described.

Two additional factors contribute to the screen distribution value actually acheived in a given commercial situation.

Two Additional Factors

The first is due to the slight departure in shape of all commercial lamp mirrors from the perfect ellipse assumed in the present calculations. Instead of all the crater images from all angles of view being precisely centered in the aperture, they are displaced in practice, by normal errors in mirror shape, to spread the light in less peaked fashion, but with negligible loss in total lumens on account of this spreading.

In the second place, the projectionist, in adjusting his optics to give the best-looking screen, may decide upon a slightly out-of-focus setting, and sacrifice somewhat on screen light in favor of a flatter screen.

The distribution values of Fig. 6, there-

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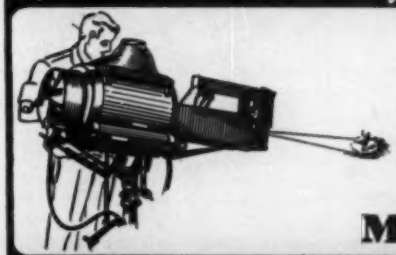

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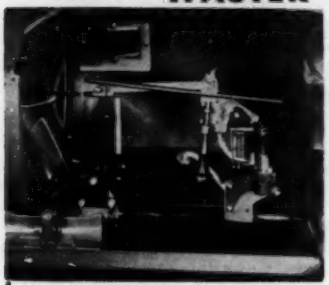

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fore, are not necessarily the same as those which would be obtained in a practical projector assembly, although the basic trends between sizes and optical speeds are as indicated.

Carbon Consumption Rate

Let us consider next the consumption rate of the carbon. This depends so much on carbon design, on the method of burning, whether the carbon is plated or unplated, whether it is burned with or without current jaws, and with or without water-cooling, that no simple relationship exists. However, in situations where equivalent screen light is given by carbons of different sizes, the smaller carbon will always burn the faster. The exact magnitude and economic significance of this difference requires determination in each specific case, and is always an important factor to be considered.

Blowing of the arc according to principles recently defined by Dr. Edgar Gretener,[2] is also a major factor in the determination of current and carbon efficiency. Apparently the light secured at a given current is very substantially increased by this blowing, while the carbon consumption per unit of light output is less markedly affected.

Screen Light Color Value

With respect to screen color, it is most difficult to express color differences in terms of numbers of true comparative significance, and no attempt has been made to do this with the various trends reported here. However, the larger carbon gives a more complete filling of the aperture from all angles of view, and also tends to give a more uniform screen color in any comparison of different sizes at equivalent light levels. Further, with the larger-sized carbon, screen light and color uniformity is better maintained over a wider range of maladjustment of the positive-carbon position.

It was previously indicated that the smaller carbon requires a higher collection angle for maximum screen light than does the larger carbon. This general relationship is indicated for four different optical speeds by the curves of Fig. 7. The increasing slope at the higher speed shows that this effect of carbon size becomes more pronounced as the speed increases.

Speed of Optical System

Finally, the relationships plotted in Fig. 8 show that increases in optical speed into the aperture do not result in as great increases in illumination as the relative optical speeds alone would predict. Compared to the illumination obtained with an F:2.5 system, an increase to F:2.0 should theoretically give 6.25/4.00 or 1.56 times as much illumination. The ratio calculated with 16-mm carbons is 1.48, and for 9-mm carbons, 1.40—95% and 90%, respectively, of the theoretical amount.

As might be expected, this departure from the theoretical is greatest for the

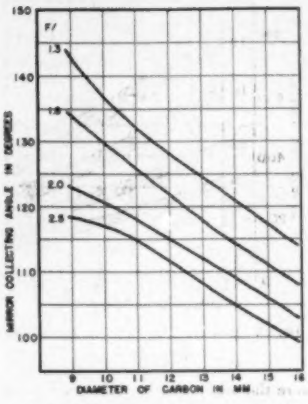

FIG. 7. Collecting angle giving maximum screen light.

[2] "Physical Principles, Design and Performance of the Ventarc High-Intensity Projection Lamps," by Edgar Gretener; J. Soc. Mot. Pict. & Tv Eng., Oct., 1950.

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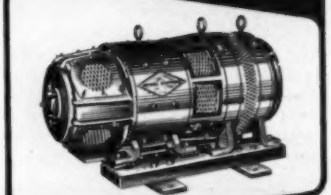

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smallest carbon, the reason being that the crater images on the aperture are not sufficiently large to fill the aperture completely at all angles of view, and that the brightness distribution across the crater is most peaked for the smaller carbons.

This paper thus defines certain basic relationships which should be recognized in the most effective development of the

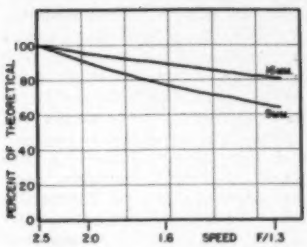

FIG. 8. Actual versus theoretical gain in screen light with increasing optical speed.

combined arc carbon and optical system to do a given job.

Broadly speaking, a small carbon can be utilized to give highest current efficiency; this requires the use of a high collection angle, gives a less uniform screen-light distribution and screen color, and is more sensitive to light and color variations as the carbon is moved from the exact focal position. The larger carbons operate with lower current efficiency but give a higher quality performance in all other respects, at a higher cost.

The choice in a particular situation should be based upon a balance of these various factors as applied to the specific economic considerations involved. As in other fields, there are proper applications for many possible combinations of cost and quality.

THE MAGIC OF COLOR

(*Continued from page 9*)

indistinguishable from the blank side of the film. This was especially true of silent Technicolor films, for these carried no soundtrack or frame lines in silver.

Like the older double-film Technicolor, the old-style imbibition-process color films depended on two colors, and hence could not cope with yellow, purple, and certain other colors. Also, blue sky had a distinctly greenish tint. Only red, green, and brown with their several shades and tints appeared at all natural on the screen. The next step in the development of the Technicolor process was to adapt it to the well-known principles of *tricolor* photography.

Early Tricolor Processes

Tricolor photography is much older than Technicolor—older, even, than the movies. Several pioneers in the art of photography had successfully made tricolor separation negatives as long ago as the 1860's. Some of these sets of three negatives each were made by successive exposures in ordinary "still" cameras through vermilion, emeraude, and indigo filters. Other experimenters had actually constructed workable "one-shot," or beam-splitting, cameras in which the three negatives could be exposed simultaneously.

Only the lack of panchromatic photographic emulsions hampered these early experiments in color pictures. It took an enormously long exposure to get an impression on the plate exposed through the vermilion filter.

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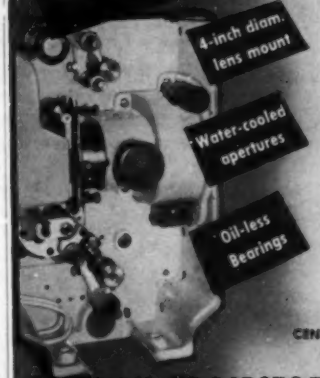

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these colors, and to no others, that the color-receptive centers of the eye are tuned. "In-between" colors are synthesized by the eye from various proportions of the three primaries. Any method of color photography which utilizes all three primaries is therefore capable of reproducing every color which human vision can appreciate.

The old-time photographers who had devised one-shot color cameras reproduced their pictures by additive projection. The cameras, themselves, were used as projectors. The negatives were printed on lantern-slide plates and placed in the projector (camera) which was fitted out with three separate light sources. Each positive plate was placed behind the same color filter used for photographing the negative from which it was printed. Thus one plate was projected with vermilion light, the second with emeraude, and the third with indigo light.

Thomascolor, Rouxcolor Processes

Superposition of the three primaries, in varying proportions, resulted in a recreation on the screen of the original scene in full natural color. The results were said to be very good. This process has no limitations as far as color rendition is concerned.

Thomascolor and Rouxcolor are attempts to adapt the simultaneous additive tricolor process to motion-picture projection. Four frames, two side by side, occupy the space of a single frame of standard 35-mm film. Three of the diminutive frames carry the color record in black-and-white; the fourth frame, unneeded, is totally black. A special lens containing aligning elements and V, E, and I filters must be used in order to provide color filtering and to superimpose the colored images on the screen.

This additive process is not satisfactory. From the projectionist's point of view, too much light is wasted. (About 80% is lost.) And registration of the superposed frames is not easily attained in the desired degree of perfection. Moreover, the tiny Rouxcolor frames are very "grainy," and slight defects in the operation of the projector intermittent are highly magnified on the screen.

Thomascolor, alias Rouxcolor, may therefore be dismissed as of no practical importance as far as theatrical motion pictures are concerned.

The Keller-Dorian Method

Another additive tricolor process of academic interest was the Keller-Dorian method known as Kodacolor. This was extensively used for 16-mm "home movies" before the introduction of Kodachrome, an entirely different method.

The blank side of Kodacolor raw stock was "lenticulated," or embossed, with tiny cylindrical lenses running lengthwise—about 559 of them to the inch. The film is threaded up in the camera with the lenticulated side facing the lens, over which a special filter comprising three vertical color strips (vermilion, emeraude, and indigo) is placed. The function of the color filter and film-lenticulations is to cause the image to be impressed upon the emulsion of the film as three distinct images. Each of these images corresponds to one of the filter areas, and only one.

Kodacolor film, upon development and reversal into a positive for projection, looked to the eye like an ordinary black-and-white film. To use the film, it was necessary to place an exact replica of the camera color filter over the lens of the projector. The process was then reversed; and the original scene appeared upon the movie screen in full natural color. The chief drawbacks to Kodacolor were loss of light by absorption and fuzzy picture definition on the screen.

[TO BE CONTINUED]

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